POPULAR
Computing
WEEKLY

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This Week

Spectrum games

Andy Pennell casts his fingers over another selection of Spectrum software including *Chuckie Egg* from A&F Software See page 14

Flowcharts

Noel Williams explains the importance of computer flowcharts in designing efficient programs on page 17

Dragon Rom

Peter Whittaker shows how to call Rom routines from inside machine code programs. See page 18

New releases

All the latest software games including *Corridors of Genon in 3D* by Malcolm Evans and *Cylon Attack* from A&F See page 53

★STAR
Icarus on unexpended Vic20
See page 10.
GAME★

News Desk

ZX Microdrive still in short supply

ALMOST three months after its launch the Sinclair ZX Microdrive is still in short supply

Also, the first commercially available Microdrive software is now unlikely to appear this year

Following the launch of the Microdrive in July, Sinclair has been sending out batches of Microdrive order forms to existing customers in strict order of original Spectrum purchase

A spokeswoman for Sinclair commented last week "We are admittedly still very near the top of the list

The Microdrive is still in its early stages of production We always knew that, initially, numbers would be limited '

Continued on page 5

Texas changes tack

TEXAS Instruments, one of the struggling American micro giants has decided that a new approach is needed

Having tackled the hardware problem by cutting the price of its ageing 99/4A computer to £99, it has now made changes on the software side

Texas, noted in the past for its unwillingness to divulge the technical details of its machines to independent software houses, has relented

The company has announced 15 new games cartridges written by some of the best-known US games and educational companies Among them are Broderbund, Sega, Imagic, Sierra On-line, Scott Adams, Milton Bradley and Fox Video Games

On the education side TI has teamed up with Addison-Wesley and a British company, Ivan Berg Software

Included in the first batch of six for the UK is *M A S H* from Fox based on the film and tv series

Classified Classified Classified Classified



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The Team

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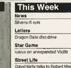
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This Week



Editorial

Mainstream book publishers are finally moving into the computer market in a big way

Penguin has announced a range of twin book/cassette titles including the enormously popular *Warlock of Firetop Mountain* by Steve Jackson and Ian Livingstone of Games Workshop. Other titles include *The F-Plan Computer Pack* and *The Korth Trilogy*

Pan, through its link with computer publisher VNU, has already launched four titles, with six more to follow before the end of the year. Longman has set up a software division with 11 educational programs for young children. Collins Educational has produced a series of packages around Michael Bond's *Paddington Bear*. Websters is launching a 400-page software directory

Computer books are no longer 'small time' — they are now recognised as a valuable sector of the book market. However, while the entry of traditional publishers into the computer market should result in an improvement in quality, there is still some way to go. Too many books are still appearing in the form of '20 best games for your ...'

The key to success in the computer book market lies not just in marketing and distribution, but also in the ideas behind the books

Next Thursday

Play Bug Attack and build a brick wall around the queen bug by picking bricks up from the bottom and taking them to the top — but avoid the other bugs. Next week's star game for Dragon 32 by Mark Sach.


The ADVENTURES of MONTY The Mountaineer
De Apibus Semper Dubitandum Est
"AVALANCHE!"
MONTAGUE MONTAGUE III, DUKE OF BOLTON HAS ORGANIZED AN EXPEDITION TO CLIMB MOUNT EVEREST BUT MONTY AND THE TWO OTHER BRITISH CLIMBERS IAN AND TOM DID NOT RETURN TO CAMP THE PREVIOUS NIGHT. THE AMERICAN HANK TAKES CHARGE OF THE SEARCH PARTY
"LEE YOU GO WITH FRED BACK TO BASE CAMP AND GET MORE SUPPLIES. CARL AND I WILL SEARCH FOR THE OTHERS."
SURE THING HANK! WE'LL SEE Y'ALL BACK HERE LATER"
GUT. DIS MAY VELL BE MY CHANCE TO DISPOSE OF ZIE SCHWEINHUND AMERIKANER!"
NOT FAR AWAY MONTY TOM AND IAN ARE TRAPPED AT THE BOTTOM OF A CREVASSE
"DASHED LUCKY REALLY THAT THIS FISSURE HAS SHELTERED US FROM THE WEATHER. YOU SHARE THE LAST GINGER NUT, CHAPS. I AM SURE THAT AID IS IMMINENT
"HAVE THE GINGER TOM I'LL TAKE THE NUT
MEANWHILE AT THE TOP
"LOOKY HERE WHAT I'VE FOUND CARL. MONTY'S HAT. THEY MUST BE TRAPPED BELOW"
"AND IN A MINUTE SCHWEIN YOU WILL JOIN ZEM IN OBLIVION"
SUDDENLY, THE TWO CLIMBERS HEAR A NOISE ABOVE THEM
RUMBLE
GOTT IM HIMMEL!"
"WATCH OUT AVALANCHE!"
WILL HANK AND CARL SURVIVE THE AVALANCHE? WILL MONTY BE RESCUED? WILL CARL'S EVIL PLANS COME TO FRUITION? WILL THE AARDVARKS REACH THE SUMMIT OF MOUNT PALOMAR BEFORE PETERKINS THE FERRET STRANGLER?
DON'T MISS NEXT WEEK'S EXCITING EPISODE!
CAN YOU ORGANISE AN EXPEDITION BETTER THAN MONTAGUE MONTAGUE III? EVEREST (FOR THE DRAGON 32) BRINGS YOU ALL THE EXCITEMENT OF HIMALAYAN MOUNTAINEERING. YOU CAN CHOOSE ANY ONE OF THREE PEAKS IN SPRING OR AUTUMN, BUT ONLY THE BEST AND THE BRAVEST WILL LOOK DOWN ON THE ROOF OF THE WORLD
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QUALITY SOFTWARE FOR THE DRAGON 32, ORIC-1 AND BBC MODEL B MICROCOMPUTERS

ZX Microdrive

Continued from page 1

She declined to disclose the number of the devices supplied to customers so far "We are however very happy with — the take-up rate from Spectrum owners — the drive has been greeted with enthusiastic response"

No date is yet available for the launch of the first Sinclair-brand software for the Microdrive

Psion the software house which has worked closely with Sinclair in the past and might be expected to be one of the first companies to support the Microdrive has no plans to do so until early 1984

Commented Psion's David Potter "The problem at the moment is not the Microdrives themselves but a shortage of blank micro cassettes We would need hundreds of thousands a month to meet demand and Sinclair's subcontractors are the only people with the sophisticated machinery to manufacture them

"That is in Sinclair's hands to sort out

"Notwithstanding a few teething difficulties with the Microdrives I feel reasonably confident that, after they have been sorted out we will produce Microdrive software in the early part of next year

But at the moment, it is too early for us — and others — to do so," he added

Silversoft partners in split

THE two founders of the long-established software house Silversoft have split

Dave Patterson has left to set up a new company Screen Play, leaving Dougie Bern to continue to run Silversoft

Dave Patterson blamed personal differences for the split "It really came down to individual values — it reached the point when I was just not enjoying it when that happens it's time for a change" he commented

Now Dave has established Screen Play, based in the heart of Glasgow, which will produce material for the BBC Dragon Commodore 64 and Spectrum computers

Screen Play has signed up nine freelance programmers so far to produce material and the first titles are scheduled for the end of November

To begin with Dave plans four BBC games, a menu driven graphics/animation package for the Dragon and a Centipede game for the Commodore 64

Of the new company he said "Back a few months ago I was beginning to leap out of tall buildings so I don't mind having to go back to square one and start again "

Dougie Bern declined to comment on the split "Silversoft has been quiet for quite a while and now all I want to do is get it back on the right track"

As part of this plan Silversoft this week announced the release of four new titles for the 16K Spectrum, priced at £5.99 *Mission Impossible*, *Brain Damage Armageddon*, and *Exterminator*

Screen Play are at 134 St Vincent's Street Glasgow G3 Silversoft are at 271 273 King Street London W6

Scope for games

SCOPE is a new computer games-writing language offering the speed of machine-code without its complexity

Initially the language — developed by ISP — has been written for the 48K Spectrum

Scope comprises 31 commands in only 3K which operate as a complete fully-recursive compiled language Among the keywords are *Put*, *Plot Draw Colour Scroll* and *Wipe* Instead of *Goto* and *Gosub* Scope uses *Jump* and *Jump Label* Like Forth Scope employs commands like building blocks using existing keywords to define further ones

On the Spectrum, after the Scope compiler is loaded at Ram-top, a Scope program is written within Basic *Rem* statements A completed program is then compiled in seconds using the Basic command *Print Usr 60450*

To run a Scope machine-code program it is necessary first to load the Scope compiler

ISP is a new company set up to develop the language Founder and Scope author Allen Pendle says "Scope means anybody can write in machine-code and the system does not suffer any of the limitations of menu-driven games writing programs"

Scope will be available for the 48K Spectrum from the beginning of November It will come with a comprehensive manual, priced at £11 95 Details from ISP Crown House, 38b High Street, Godalming Surrey

Shot by his own gun



THE Stack Light Rifle converts your home into a shooting gallery

Using the light rifle connected to a computer in conjunction with specially written software you can shoot targets which appear on screen

The rifle works in the same way as a light-pen The computer can tell exactly which part of the screen the rifle is pointing at by finding the time from starting a new tv scan to the time the tv's beam lines up with the rifle Light from the tv is detected at the rifle by a light-sensitive cell inside the barrel of the rifle By matching the time of scan to the point at which the trigger is pulled the computer can detect the difference between a hit or a miss

The Stack Light Rifle comes complete with three games and costs £29 95 The device is compatible with Spectrum Vic20 and Commodore 64

Wargames comes true

THE computer crime plot of the hit film *Wargames* will not seem so far fetched after the real-life events of last week

FBI agents raided the homes of more than a dozen teenage computer enthusiasts around the US last Wednesday following investigations into unauthorised intrusions into various national computer networks

The investigation began in July after unauthorised accesses into the Telenet system linking some 1,200 commercial computers across the country were detected

FBI officials said last Thursday that the teenage computer buffs — in New York, Los Angeles, Detroit and Oklahoma — are believed to have caused damage estimated at thousands of dollars to computer systems by changing or deleting information

Worringly, among the systems reported to be involved are computers at MIT the nuclear laboratories at Los Alamos, and at the McClellan Air Force base in California

Big losses for Atari

MORE bad news from Atari Last week the company reported further big losses

A third quarter deficit of $180 3m led to the parent company, Warner Communications again showing an overall loss for the quarter of $122 4m Announcing the dismal news chairman Steven Ross place part of the blame on a US price war precipitated by distressed companies selling off product cheaply in order to leave the business

● Acorn offered its shares on the Unlisted Securities Market for the first time last week

At no time on the first day did the shares reach their expected price of 120p They dipped first to 118p and then to 108p

Manic Miner ... 1

On trying *Manic Miner* with the Kempston joystick, I was startled to discover that *Miner Willy* could be controlled with the usual left-right control and fire as jump

I was surprised because the packaging mentions nothing about the program being Kempston compatible — surely a fact that could only increase sales?

David Atter
Braeside
Killichonan
Rannoch Stn
Perthshire PH17 2QW

Just a nibble

I have been pondering over a question I found in a computer magazine but I am unable to find the answer in any of my books The question is what do you call a group of four bits or half a byte? I am going mad over it, so could you send me the answer or print it in your magazine

M B Sharp
32 Duddingston Drive
Kirkcaldy
Fife
Scotland KY2 6JP

The solution is simple Half a byte is a nibble

Disc drive problems

Two weeks ago, I purchased a Dragon Data disc drive Since then, I have encountered several interesting features which may be of interest to you Most of them are omissions from the provisional manual provided with the drive

1) Use of ' and ,' as separators

The manual only describes the use of ' for separating multiple variables of strings in *Fwrite* statements The separators act in the same way as separators in *Print* statements So if one were to execute *Fwrite File' ,A$ B$ C$* then *A$* and *B$* will each be *Loaded* on to the disc followed by a number of space characters to make the string length up to 16 This will not happen with *C$* since it is followed by an end of line terminator

If this formatting is not required, a ',' separator can be used, ie *Fwrite"File", A$ B$ C* This can be similarly applied to *Fwrite File" A$ 'B$ ", C$*

2) *Eof* function

The correct format for this function is *Eof(File XXX)* and not *Eof(File)* as in the manual

3) *Dir* to a printer

The *Dir* list can be printed on a printer by executing *Poke111,245 Dir*

4) Run function

The Run function seems to work with machine code programs This is not obvious from reading the manual

5) Number of open files

The manual states that 10 files can be open simultaneously It seems that this means 5 write files and 5 read files can be open, ie, you cannot open 6 write files

6) Initialisation sequence

The disc controller is sensitive to the way the system is powered up and the disc is inserted If the Dragon is switched on with the disc drive off or no disc inserted and a disc is subsequently inserted it cannot be accessed, an SK error being printed whenever an access is attempted The reset button must be operated before accesses will work

From prior experience, I am always worried about corrupting discs when powering up The best sequence on the Dragon would appear to be (a) power up the drive, (b) insert the disc and (c) power up the Dragon

7) Electrical problems

There are two firstly whenever the drive motor is running, a patterning appears on the tv screen This only affects the Dragon and not ordinary stations The drive is standing about 12ins from the Dragon Secondly, I suspect that the Dragon s power supply is overloaded by the additional disc controller load as it gets very much hotter and the sound generator is prone to crackling possibly indicating low voltage

I would welcome any comments or suggestions on the electrical problems, or indeed any of the other points

J A Niblock
Ardennes
7 Kingsley Crescent
Bulkington
Nuneaton
Warks CV12 9PL

Manic Miner ... 2

I thought I'd let you know of my highest score on *Manic Miner* It stands at 101, 731 — that's twice through and up the warehouse It's the best game for the Spectrum I think and has given me hours of enjoyment

David Acklan
44 Pinfold Street
Howden
Goole
Humberside

Not the champion

In reply to Julian Courtland-Smith (*PCW* 29 September-5 October), I think I would be capable of emulating his friend's achievement of scoring 169,990 I read his letter of his friend's ability to play *Frogger* successfully and it made me realise that if it were not for the bugs in either our computer or the tape of *Frogger*, I would stand a chance of beating my top score of 25,790

Every time I am doing well I lose a life for no apparent reason But sometimes an error appears and I can do nothing but turn off and load it again I don't think David is world champion

Elizabeth Memeck
41 Church Lane
Leeds LS15 8BB

Amended files

In the issue 6-12 October, there is a potentially frustrating error in the formulating for writing to and reading from tape files program for the Commodore 64

Line 3100 should be amended to read *3100 Close 1. Return* and similarly line 4120 should be amended *4120 Close 1 Return* Without these amendments, the saved data will be incomplete and reloading will prove impossible

In addition it should be noted that each data field, ie, name, address, etc, must have a response — without a response, a null character is entered and subsequent records will 'fall' into these null fields corrupting the whole data base

Peter Gibbs
14 Beacon Way
Heath Hayes
Cannock
Staffs

A spider in the works

While inspecting the leads to my Spectrum this morning, I discovered a cobweb stretched over the mic, ear and power leads Slightly puzzled, I removed the web and, on further inspection, discovered a medium sized spider had crawled into the I/O port at the back and had extended its web to cover most of what I could see of the inside of my computer

Not wishing to invalidate my guarantee by opening the case, I am somewhat at a loss as to what to do next I am sure that the spider cannot survive for too long inside the case (unless it can get at the bugs in the Rom) but could it cause any serious damage to the components or cause a short circuit with its webbing if I switch the computer on? Am I justified in returning the computer because it is not spider proof?

C R Mart
Ranmoor House
Shore Lane
Sheffield S10 3AY

Resisting the temptation to utter phrases such as 'fly in the ointment' and 'sticky situation', I can only say that this is a new one to me. Perhaps the spider was attracted by the residual heat inside the Spectrum after you switched it off?

In any event, while Sinclair is to blame for the 'Rom bugs', I don't think you can really blame them for not making the Spectrum spider-proof

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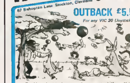
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Icarus

A new game for unexpanded Vic20 by H Rivera

You are soaring high above the deep blue sea, with your wings made from goose feathers and wax, when you see a feather fall in front of you. Being curious, you look up into the sky only to be shocked by the sight of your son flying so close to the sun that the wax holding his feathers to his arms is beginning to melt.

Your task is to save your son, by catching the feathers and fixing them to his arms again.

Part one of the program sets up the hi-res definable graphics and contains the instructions while part two consists of the game itself.



Part 1

```
5 POKE55,0 POKE56,20 POKE51,0 POKE52,28
10 PRINT"■"
11 S=32768 T=7168
12 FORI=0TO255*8+7 POKEI+T,PEEK(I+S) NEXT
18 FORA=7200TOT+8*22+7 READ P POKEA,P NEXT
69 REM****SPLASH****
70 DATA166,145,76,34,25,6,33,15
80 DATA12,16,144,63 64 217,254,255
90 DATA65,66,134 24 96 135,24,224
99 REM****YOU****
100 DATA0,12,30,31,31,62,248,0
110 DATA0,48,120 245,249,124,31,0
119 REM****FLUME****
120 DATA24,60 126,255,126,24,60,24
129 REM****FISH****
130 DATA0,1,51,122,254,122,51,1
139 REM**** 80 ****
140 DATA0 238,170,254,170,238,0,0
149 REM****DIVE****
150 DATA66,36 153,153 219,219,219 255
160 DATA255,255 255,90,24,60,60 24
169 REM****BLOCK****
170 DATA255 255,255 255,255,255,255,255
179 REM****SPACE****
180 DATA0 0 0,0,0,0,0,0
189 REM****ICARUS****
190 DATA12,30,30,12 63,127,192,128
200 DATA99,247,247,99,255,255,255,56
210 DATA0,142,159,31,206,244,16,31
220 DATA0 0,0 0,63,127,192,128
230 DATA2 7,7,3,255,255,255 56
240 DATA0 0,0 0,255,255,255,56
250 DATA0,14 31,31 206 244,16,31
400 PRINT"■"
500 PRINT"■KING MINOS OF CRETE ■IMPRISIONED
    DEDALUS■ AND HIS SON ICARUS."
510 PRINT"■DEDALUS FASIONED ■  SOME WINGS
    FROM WAX ■  AND FEATHERS",
520 PRINT", ■UNFORTUNATELY ICARUS ■FLEW
    TOO CLOSE TO ',
530 PRINT"THE■ SUN AND THE WAX BEGAN ■TO
    MELT."
540 GETA$ IFA$=""THEN540
550 PRINT"■■YOUR JOB IS TO CATCH ■ICARUS'
    FEATHERS AND  ■TAKE THEM BACK TO HIM",
560 PRINT"BUT BEWARE YOU ARE ■  RUNNING OUT
    OF ENERGY ■SO ",
570 PRINT"YOU HAVE TO ■INCREASE YOUR
    ENERGY ■ BY EATING THE FLYING ■ FISH.'
571 GETA$ IFA$=""THEN571
572 PRINT"■■■■■■CONTROLS'
573 PRINT"■■■■■■■
574 PRINT"■■■■■■■ ■■!"
575 PRINT"■■■■■■■
579 GETA$ IFA$=""THEN579
580 PRINT"■■■■■■■■■■■■
    "
```

Part 2

```
1 CLR EN=1000 S1=36874 S2=36875 S3=36876 V1
  =36878 POKEV1,15 POKE649,1 POKE36869240
2 DATA4 -18 -41,-42,-65,-66,-67,-46,-47,
  -26,-4
3 PRINT"■■■■■■PRESS ANY KEY"
4 GETA$ IFA$=""THEN4
10 POKE36163,255 PRINT"■" POKE36879,235
   T=7680 C=36400 DEFFNA(X)=X-T+C
20 L=3 GOSUB100
30 FORA=396TO505 POKEA+T,14 POKEA+C,6 NEXT
40 GOTO499
99 END
100 IFL=-1THENDI=1
110 ONL+1GOTO115,120,130,140
115 PRINT"■■■■■■■■■■■■UV" RETURN
120 PRINT"■■■■■■■■■■■■TR" RETURN
130 PRINT"■■■■■■■■■■■■QR" RETURN
140 PRINT"■■■■■■■■■■■■PQR' RETURN
149 REM FEHTNEF FALL
150 F=RND(1)*8+T+52 D=RND(1)*1.5+21.3 FE=1
    L=L-1 GOSUB100
160 POKEF,32 F=F+D POKEF 9 POKEFNA(F),0
    EN=EN-2
170 IFPEEK(F+22)=14THENFE=0 POKEF,32
    GOSUB100
180 GOSUB600
190 IFPEEK(F)=8THENCA=1
195 RETURN
199 REM FLY FISH
200 S=RND(1)*10+T+6+22*17 P=0 FI=1
210 POKES+P,32 READP POKES+P,10 EN=EN-4
    POKEFNA(S+P),1
220 IFP=-4THENPOKES+P,32 RESTORE FI=0
223 GOSUB600
225 IFPEEK(S+P)=0THENGOSUB700 FI=0 RESTORE
230 GOSUB600 RETURN
499 Z=T+10+22*10
500 K=PEEK(197) KE=(K=17)*22-(K=33)*22-
    (K=54)+(K=14)
505 BB=PEEK(KE+Z) IFBB=14ORZ+KE<T+44ORBB>
    15ANDBB<22THEN550
510 POKEZ,32 Z=Z+KE POKEFNA(Z),4 POKEZ,0
    PRINT"■" EN"■■■■■■■■■■■■■■"SC"■ '
520 IFEN<=0THEN900
550 IFFI<>1ANDRND(1)>.9THENGOSUB200 GOTO565
560 IFFI=1THENGOSUB210
565 IFDI=1ORL=-1THEN900
570 IFFE<>1ANDRND(1)>.9THENGOSUB150 GOTO585
580 IFFE=1THENGOSUB160
585 IFCA=1THEN800
590 GOTO500
600 K=PEEK(197) KE=(K=17)*22-(K=33)*22-
    (K=54)+(K=14) EN=EN-1
602 PRINT"■" EN" "
605 BB=PEEK(KE+Z) IFBB=14ORZ+KE<T+44ORBB>1
    5ANDBB<23THEN630
610 POKEZ 32 Z=Z+KE POKEFNA(Z),4 POKEZ,0
630 RETURN
700 POKES+P,11 POKES2,130 FORA=0TO20 POKES1,
    A+200 NEXT POKES1,0 POKES2,0 POKES+P,32
710 EN=EN+60 RETURN
800 FORA=0TO100 POKES1,A+100 NEXT POKES1,0
810 IFPEEK(F+1)=14THENPOKEF,14 POKEFNA(F),
    6 GOTO815
812 POKEF,32
815 F=Z+44 POKEF,9 POKEFNA(F),0
820 GOSUB600 IFPEEK(Z-22)>15ANDPEEK(Z-22)
    <23THENL=L+1 GOSUB100 CA=0 SC=SC+15 GO
    TO840
830 GOTO810
840 POKEZ,32 FE=0 POKEF,32 GOTO499
900 POKET+31,32 POKET+32,32 POKET+33,
    32 POKEF,32
910 FORA=T+32TOT+32+22*15STEP22 POKEA,12
    POKEA+22,13 POKEA-22,32
920 FORB=0TO50 NEXTB NEXTA POKEA-22,
    32 POKEA 5 POKEA-1,4 POKEA+1,6
925 POKEFNA(A),6 POKEFNA(A+1),6 POKEFNA
    (A-1),6
930 POKE36877,200 FORB=15TO0STEP-.01 POKEV1,
    B NEXT POKE36877,0 POKE 36869,240
935 POKEA,32 POKEA+1,32 POKEA-1,32 POKES+P,
    32 POKEZ,32
940 PRINT"■■■■■■■YOUR SCORE WAS",SC PRINT"
    ■DO YOU WANT ANOTHER■   GO?" GETA$
950 GETA$ IFA$=""THEN950
960 IFA$="Y"THENRUN
970 PRINT"■" POKE36879,27
```



WORK FORCE
"JAWS REVENGE"
16K & 48K SPECTRUM
PIRATE ISLAND
48K SPECTRUM



WORK FORCE
DOOM BUGS
Doom Bugs
DO NOT PASS GO
48K SPECTRUM
GO

An enterprising move

***David Kelly** talks to Robert Madge, technical director of Elan computers*

The climate for the launching of new microcomputers has changed quite dramatically over the last six months.

Particularly in the United States the weather could now be said to be decidedly chilly. At least, Atari, Texas and Mattel would appear to be finding it so.

Yet the Elan Enterprise, from a new UK company, is attempting to break into the home computer market despite the reverses suffered by these companies. Due to be launched in April 1984, the Enterprise 64K and 128K will cost £199.95 and £299.95, respectively.

What is so special about the Elan Enterprise that will make it compete with the likes of Commodore and Sinclair?

Elan's Robert Madge is confident. He believes the Elan offers the best features from every micro, rolled into one machine.

It can display up to 16 colours at one time from a pallette of 256 colours. It has 8-octave, four-voice, stereo sound, a full travel keyboard, built-in word processing software processor and built-in joystick. It can handle a 64K Rom cartridge.

The Enterprise has twin cassette ports, twin joysticks ports, Centronics and RS232 interfaces. Add-on 64K memory expansion units and twin Sony microfloppy disc drives are options.

In short, Robert reckons the Enterprise is everyone's ideal computer.

The machine has been designed for Elan by Intelligent Software, an established development house of which Robert is also a director.

"What we were asked to do in our brief was to design a computer which would be among the top few sellers, which would appeal on a whole number of levels — for games, for home business, for enthusiasts and novices and also appeal to commercial software houses who will have to produce material for it if it is to be a success."

A complete product

Intelligent has been a successful hardware and software development house since 1981, designing for such companies as Milton Bradley, Sinclair, Tandy, Dragon and Parker Bros. "We normally give a client a complete product — developed to the point where it can be taken into production," says Robert.

Work on the Elan project began a little over a year ago. One of Intelligent's strengths has always been to write software which exploits the hardware to the full and the Elan has been developed from "tip to toe" as a complete new design. Robert: "It is an approach with considerable advantages and some disadvantages.

"It makes us competitive. Most computer manufacturers do not have the expertise to design a computer from scratch — particularly the software. It is a weakness of the Japanese and Hong Kong companies. There are many examples in the computer market at the moment — Mattel, Sharp, Dragon.

"Nearly all the Japanese system software is bought in from companies like Microsoft."

This was one option Intelligent could have taken. "It is well proven — people know what to expect from it. But, we would have had much less freedom to tailor the Basic to the machine. Microsoft showed no interest in engaging in modifications — they just wanted to hand over a complete package.

"Another problem is that there are many features lacking in Microsoft Basic — the world of programming has moved on. For example, there is very little support for structured programming.

Written from scratch

"Yet we had to have Basic in a very good and enhanced form, with particularly strong graphics and sound — these are the starting point for all independent companies to produce software for it."

The other problem with an off-the-shelf Basic was flexibility. "We had to make sure that, with the Basic and operating system software, we hadn't closed the door on any future developments. We are not crystal-ball gazers. Who knows what may wish to be connected to a computer in the future?"

So Elan decided to write its own software from scratch, using the Basic outline recently proposed by the American National Standards Institute (ANSI).

"We wanted a Basic which was likely to be accepted as the standard programming language of the future — a version which would answer most of the objections people make to Basic.

"In the Elan I think we have achieved that. The total Rom used in the Elan is 32K — including the Basic, Elan's own *Eros* in-built operating system and word processor."

The Basic has all the normal block-programming features — *Do* loops with tests for *While* and *Until*. Functions and expressions can be defined as procedures which can be called from within a program.

One of the more interesting commands is *Set*. It allows various machine options to be set — *Set video mode* determines the graphics mode. *Set Byte* and *Ask Byte* are the Elan equivalent of *Poke* and *Peek*. *Set Pixel Size*, *Set Character Size*.

The Elan has *If* and *ElseIf* blocks. The *Picture* function allows a group of graphics statements to be defined and then called from within a program. *Music* does much the same for sound statements. Elan Basic has *Plot*, *Fill*, *Circle*, *Oval*, *Paint*. The machine has a number of pre-defined sound commands — as well as *Play*, *Pitch* and *Volume*, *Bang*, *Beep*, *Boom*, *Ping*, *Pop*, *Splat* and *Zap*.

You can change the functions of any keyword. Functions can be defined in Basic and then called. There is also a set instruction to go into the operating system — additional Basic commands can be added in machine-code, loaded in from cassette or disc.

The operating system is designed so that when a new peripheral is added — say discs — new commands held in Rom-based code in the new add on are automatically patched into the existing Basic as additional commands.

The video controller is extremely flexible. Under machine-code control you can split the screen up any way you like — any number of horizontal bands and you can have as many modes of display as there are mode lines, 256.

From Basic you can define 16K video pages — up to 256 within the limit of the available Ram. Then it is possible to display at the same time on screen any of those pages by defining display windows.

The Elan offers as graphics options 16 modes, of which 8 are non interlaced. These are, for text, 42 columns x 28 rows with 1, 2 or 4 colour pairs and 64 columns x 28 rows with 1 or 4 colour-pairs. And for graphics, 336 pixels by 256 lines using only two colours or using all 16 colours and 672 pixels x 256 lines using two colours.

Each mode is a trade off of pixel and colour resolution against speed and Ram used — ranging from 2.2K to 24.3K per screen (rough figures).

The Elan is Z80 based for two reasons: it is CP/M compatible and because, by chance, one of the display modes on the Elan closely emulates that on the Sinclair Spectrum. Says Robert: "There is an awful lot of fundamental software written for the Z80. Also we couldn't have got such a versatile screen display using, for example, a 6502. Also, with the Z80 you can extend the address space in 64K blocks all the way up to 4M."

Again, says Robert, "with the whole design of the Elan we have not tried to produce something fundamentally new. Just better. With all the good features from other machines taken and developed as far as possible." ■

Along the cakewalk

***Andrew Pennell** runs the gamut of another selection of Spectrum software*

The amount of Spectrum software on the market is already huge and growing all the time Several new companies are appearing and some are very promising indeed though a few of the more well-known companies appear to be slipping under the competition

Super Digger from Abacus comes with very fancy packaging describing the game as entertaining for all the family The plot is familiar — you are a man in a system of floors separated by ladders populated with several man eating monsters Armed only with a pick-axe you have to dig holes, and when a monsters falls into them, go and hit it over the head

A plot such as this can be excitingly implemented on the Spectrum — it forms part of the *Horace & the Spiders* game, which shows just what can be done with it However *Super Digger* is not a very inspired version at all — the graphics and sound are both fairly rudimentary

It is now becoming the norm for games to feature sprite-type graphics — that is each object is not restricted to the 8 x 8 pixel character squares This allows large shapes to move smoothly and realistically But *Super Digger* uses small crude character sized monsters which are none too exciting and move very jerkily When you finish a screen instead of getting a different arrangement of floors and ladders you get the same one again with one more monster The controls to move the man are restricted to the cursor keys with no provision for a joystick

On the reverse side of the tape is what Abacus describe as a "Free B side bonus", a game called *Chase* It is a version of the arcade game where you must avoid another car travelling in the opposite direction around concentric squares and is not very exciting

Bedlam is a game from a company new to me called AWA Software You are a spaceship in a criss-cross network of corridors which has a large number of other, rather unfriendly inhabitants You must move around the screen and shoot them all, before they catch you and on the higher levels fire back at you

The creatures themselves are colourful and very varied though a little on the small side They move quickly and smoothly speeding up as you kill more of their associates Occasionally white saucers appear and they move extremely quickly, firing at you as they go If you kill 10 of them (which is almost impossible), you get a bonus life

A pathway through space

To control your men, five keys are used — four for the direction and one to fire, and you can choose them yourself Again no joystick option is offered

The only real problem with *Bedlam* is that to move your ship in another direction you must press the relevant key twice — once to rotate it, and the second time to actually move it This is a big disadvantage especially if a creature is close on your heels because you can t turn corners quickly The other problem that I found is that the volume is very critical as you *Load* it, because there is a non-standard tone recorded at the end It took a good deal of fiddling to eventually find the right level

Bedlam is a very good program from a new company, with good graphics and sound, but it's a bit awkward to control

Triplex, by Workforce is a game consisting of three very different sections hence the name In all three sections you are a green space ship with a gun which you control using some very well chosen keys though there is no joystick option

The first section is a variant of *Asteroids* — several large moons move around the screen and you have to avoid hitting them while shooting at them To destroy each moon you must hit it 15 times — it gradually changes colour the more you hit it On a black and white television though it is very difficult to determine just how much you have damaged each moon

When you finish the first section your score so far is given based on the number of shots taken and you progress on to the second part In this section you must cross a curiously named cakewalk which is a pathway through space Each side of the cakewalk are scrolling star clusters and several weird objects You must avoid them shooting whenever possible as well as avoiding the stars

If you manage to complete the cakewalk you go to the third screen which is a sort of sideways *Space Invaders*, in which you must destroy each ship in turn as it comes for you It is rather unfair that they fire about four fast missiles at you, when you can only reply with one feeble missile

Although the graphics in *Triplex* are superb the game is not very addictive and has a couple of flaws One is that the machine will reset on the ground screen if a joystick is connected and that the number of lives you have left is never displayed On screen two you often get killed for no apparent reason and there is a serious bug that removes all your remaining lives if you collide with the bird at the far left position *Triplex* shows that however brilliant the graphics they cannot compensate for a poor plot

Last Sunset for Lattica, from Arcade Software is a type of *Beserk* game but on a larger scale You are in a big maze of old buildings which contains no less than 600 creatures, all of which seem to have a grudge against you You must negotiate the maze while avoiding the missiles and gaining points by shooting the aliens You die if you touch the edges of any passage, but spread sparsely around the place are life potions which give you bonus lives

When you move your man to the edge of the current screen it is cleared and a new one printed It would be better if it scrolled as you moved, as there are some places where the screen kept switching between two different displays

The graphics are neat and very colourful The controls to move are the cursor keys or joystick

The idea is to find keys in the maze which will transport you to the next level When you reach the third level you can defuse a bomb that threatens to destroy the whole planet — hence the name However the only evidence of the keys that I could find in the game was in the opening titles — I never found a single key or lock at all though I feel sure they must be there somewhere

Last Sunset for Lattica has a good plot and graphics but I think the element of luck is a little too great.

Dungeon Master from Crystal Computing is a role-playing adventure game in true *Dungeon & Dragon* tradition It is not a computer adventure in the normal sense of

the word, as it has a much higher bias on combat instead of the more usual emphasis on solving puzzles Your character is assigned initial values of strength dexterity etc, though these can change through the game depending on what happens

You begin in an underground network of rooms The aim is to find a number of turquoise rings spread around them In most rooms there are objects of some kind or other — either spells for fighting magical monsters or weapons for non-magical types Every room that I got to (which wasn't very many) has at least one monster in it, which made progress rather difficult

Repertoire of funeral marches

Commands are entered via a machine-code routine which seems very slow — it was annoying that I could easily type much faster than the program could accept A faster routine could be written in Basic

Most of the normal options are available such as *Open* and *Drop* though some have non-standard names, such as *Keep* (for *Get*) When you meet a monster, you have the chance to run away or stay and fight with a weapon or a spell

Once you have chosen your weapon, the fight itself is out of your control The programs prints a running commentary of the combat, blow by blow, but you do nothing but sit back and watch Some of the fights stopped suddenly for no apparent reason, while others went on too long, as you cannot stop it yourself

The program has a good repertoire of funeral marches which are played when you kill a monster and when you die yourself which is a nice touch A disadvantage of the program's structure is that when you get killed you have to rewind the tape and reload the data to play again

One thing that makes this program very different is that you can make up your own dungeons using the *Creator* program supplied on the reverse side of the tape You can set the geometry of it, and its exact contents, fairly easily

The best of the bunch is without doubt *Chuckie Egg*, by A&F Software It is destined to become an all time Spectrum classic You must collect the eggs from each network of floors, ladders and lifts, while avoiding the vicious hens who patrol the whole area To obtain bonus points, you must collect the small packets of bird seed before the hens eat them

The graphics are brilliant, of Ultimate quality, and the sound is excellent too The only quibble I have is that the colours go a bit wrong when a moving object is on a ladder

To control your man, you have the choice of two fixed sets of keys or you can choose your own No joystick provision is included, so after a while I modified it myself (this is not to be recommended to the majority of Spectrum owners as it is far from straightforward) As far as I know this is the only game that up to four players can play and all the scores are shown on the screen simultaneously



The game is extremely compulsive, and after many hours of playing I only got to level seven For those that can go further than this, the large hen, who is in a cage at the top of the screen, apparently comes out and chases you, making it even harder

Chuckie Egg is bound to be compared with the superlative *Manic Miner* from Bug-Byte I think *Manic Miner* just beats it, because of the huge variety of different screens, and the joystick option However, *Chuckie Egg* is definitely one of the best Spectrum games, and another reason for 16K owners to upgrade

As one of the privileged few who have Microdrives, and a couple of Interface Is, I found that there is a lot of software that is almost incompatible with them I say almost because you must reset the machine prior to *Loading* it by doing *Rand Usr 0* or similar The incompatibility is caused by programs having machine code in Rem statements as they move in memory and most of the programs O reviewed here suffered

While so much new software is being released, potential purchasers should be very wary of the quality of some of it But, Ultimate have raised the required standard and some companies are responding (like A&F with *Chuckie Egg* AWA seem to be a very promising new company with a good product like *Bedlam*

I only wish more companies would offer joystick options on their games — it is a real hassle to break into them and modify them yourself when you consider how easy it is for the authors to include it. This sample is also representative of the fact that more and more quality software requires 48K to run it in ■

Firm	Program	Memory	Cost	Value (1-10)
A & F Software 830 Hyde Road Manchester M18 7JD	*Chuckie Egg*	48K	£5 95	9
AWA Software 50 Dundonald Road Manchester M20 0RU	*Bedlam*	16K	£5 95	6
Arcade Software Technology House 32 Chiselhurst Road Orpington Kent BR6 0DG	*Last Sunset for Latica*	48K	£5 50	7
Crystal Computing 2 Ashton Way East Herrington Sunderland SR3 3RX	*Dungeon Master*	48K	£7 50	7
Workforce 140 Wilsden Avenue Luton Bedfordshire	*Triplex*	48K	£5 95	6
Abacus Programs 716 Llangyfelach Road Treboeth Swansea SA5 9EL	*Super Digger*	16K	£4 95	3

A step in the right direction

***Noel Williams** reflects on the usefulness of flowcharts in constructing programs*

To design an efficient program for solving a problem or carrying out an operation, you first have to describe every stage of that problem or process precisely and state all the means by which those stages interconnect. A flowchart is one of the handiest and most common ways of doing this.

Basically, a flowchart is a series of boxes representing the various elements of your program, and a series of arrows representing the relationships between those elements. Computer flowcharts use a set of conventional symbols for the boxes, though not all the conventions are universally accepted.

Each type of box can be drawn freehand, but it is easier to use a specially designed template. These can be bought from stationers, computer supply shops and drawing supply shops. They can be as expensive as £4.50, but you don't need to spend this much unless you want to get perfect graphic results, which is pointless for most purposes. The cheapest template I've seen is 75p and perfectly adequate.

You need two kinds of knowledge to draw useful flowcharts. Firstly, you need to know what the different signs mean and how to use them and, secondly, you need to know how to turn your vague and imprecise ideas into the specific language of the flowchart.

Flowchart conventions

I'll simply list here the most commonly used signs with a brief explanation, then I'll give some hints on how to use them. A program is essentially a series of processes.

(1)

PROCESS

Thus, the simplest flowchart will just be a series of boxes arranged in the proper order, such as:

ADD 2 TO 3

MULTIPLY RESULT BY 4

(2)

DECISION

Most flowchart boxes only have one arrow coming out of them, but the decision box has at least two, representing the Yes and No answers to a particular question, usually made in Basic by *If – Then* statements. So, if you wanted your program to print 'Well done' in response to a correct answer, your flowchart might look like this:

Is answer correct?

Y

N

Print 'Well Done'

Print 'Try Again'

(3)

VDU

The most common output is displayed on VDU, so there's a box for that. Other forms of output have different representations. There's also a box for input. Different forms of input also have different representations.

(4)

INPUT

Although a program is all run by computer, that program might be part of a larger system, such as a business system, which also has manual operations, eg consulting a ledger, taking printout to a particular file, etc.

(5)

MANUAL PROCESS

Many flowcharts cannot be confined to a single page. So that you can follow the logic from one page to another, connectors are used with a letter inside, the letter being the same on both the connected pages.

(6)

or

CONNECTOR

There are at least nine other signs you can use. My advice is to buy a template which names each box, such as the one available from W H Smith.

Flowcharts help you clarify your ideas and provide a useful intermediate stage between having an idea and writing the program. They provide good guidelines during encoding and can be used for reference to assist in debugging.

It is important, therefore, to make sure that every stage of your idea is in the flowchart. The best way, particularly if the program is likely to be long, is to work on a simple overall chart first as a basic plan which fixes all the major stages, then take each of those stages in turn and work out its own detailed flowchart involving every minor element. Each of these smaller charts will end in connectors. When you've done all of the stages, all the connectors will join up. Such an approach encourages good structured, modular, programming.

A useful preliminary to writing a flowchart is to sketch in prose the main aspect of your intended program. Writing the flowchart then becomes a question of deciding how to do something, rather than deciding what to do.

Remember to draw in the loops in your flowchart, and check also that every box has at least one arrow going into it and one coming out (unless, of course, it is the *Start* or *End* box). Also, break down decisions into a series of the simplest possible binary operations, rather than a single complex decision which has more than two possible outcomes.

Leave plenty of space around and between your boxes. Almost certainly, as your flowchart develops, you'll think of extra stages to insert or feedback loops that have to be drawn in, so you'll be cursing if there's no room to draw them. A cluttered flowchart defeats its object. It is meant to clarify, so it has to be clear.

Using flowcharts also makes it easier to translate programs from one language to another, or from one dialect of Basic to another. So it is worth keeping your flowcharts in case you ever change to a different system, and as starting places for future program design. ■

A routine matter

***Peter Whittaker** explains how to call Rom routines from within machine code programs*

As a newcomer to machine code programming, I have frequently been overawed by the complexity of the programs I would have to write to obtain even simple results.

For example, the Dragon Basic command *Circle(X,Y) R C* is very easy to use, but very difficult to copy in machine code. The *Get* and *Put* commands may be more simple but still require a great deal of time and thought.

Surely it should be possible to *Execute* the Dragon's *Circle* routine in the Rom, rather than having to write your own routine? In fact some of the routines can be *Executed* directly with no problems. For example *Run Exec34213* and *Cload Exec46804*.

For the other routines we need to be rather more devious. The technique is to fool the computer into Running a Basic line in the middle of a machine code program. This is achieved in seven steps.

(1) Create a Tokenised Basic line as a data table in your machine code. Listing 1 will give the tokens for the Basic commands and their *Exec* addresses in the Rom. If any difficulty is experienced in tokenising a line, enter it as line 10 in listing 3, which will tokenise it for you. All Basic lines must end with a 0 (zero), eg *@dim Fcb 140 65 40 49,48 44 49 48 41,0*

(2) Save the Pointer at *&HA6*. This is used by the Basic Interpreter to keep track of its position in a Basic line or a direct statement, ie *Ldx>±A6 Pshs X*

(3) Point the *X* register to the start of your Basic line, ie *LeaX @dim Pcr*

(4) Load the *A* register with the first character of that line, ie *LDA X*

(5) Clear the condition code register to signal the Interpreter that the following command is to be executed, and not stored as a new program line, ie *Andcc #$FE*

(6) Execute the Rom routine, eg *Jsr 35467*

(7) Restore the Pointer at *&Ha6*, ie *Puls X Stx >$A6*

Listing 2 demonstrates the use of the *Dim*, *Draw*, *Get*, *Put* and *Play* commands. Once the machine code has been entered (either from the hex dump or the assembler listing) enter the following program, and Run it

```
10 PMODE 4,1:PCLS:SCREEN1,0:EXEC
```

This will prevent the occurrence of a *DD Error* when the machine code tries to redimension the array on subsequent *Executions*. The program is stopped by moving the right joystick to the right ■

LISTING 1

```
10 PRINT#-2,CHR$(13)
20 PRINT#-2,"TOKEN";TAB(20)"BASIC";TAB(40)"EXEC ADDRESS":PRINT#-2,CHR$(13)
30 A=127 B=32816:C=33108 D=[illegible] 205
40 A=A+1 IFA>D THENENDELSEPRINT#-2,A;TAB(20)" ";
50 B=B+1:IFPEEK(B)<128THENPRINT#-2,CHR$(PEEK(B));:GOTO50ELSEPRINT#-2,CHR$(PEEK(B)-128);
60 E=PEEK(C)*256+PEEK(C+1):C=C+2:PRINT#-2,TAB(40)E:GOTO40
RUN
```

TOKEN	BASIC	EXEC ADDRESS	TOKEN	BASIC	EXEC ADDRESS
128	FOR	33064	167	EDIT	39269
129	GO	34233	168	TRON	39641
130	REM	34326	169	TROFF	39642
131	'	34326	170	LINE	42825
132	ELSE	34326	171	PCLS	43200
133	IF	34375	172	PSET	42735
134	DATA	34323	173	PRESET	42739
135	PRINT	36925	174	SCREEN	43518
136	ON	34421	175	PCLEAR	43545
137	INPUT	34603	176	COLOR	43220
138	END	34098	177	CIRCLE	45624
139	NEXT	34857	178	PAINT	44167
140	DIM	35467	179	GET	43760
141	READ	34679	180	PUT	43763
142	LET	34432	181	DRAW	45137
143	RUN	34213	182	PCOPY	43710
144	RESTORE	34060	183	PMODE	43439
145	RETURN	34291	184	PLAY	44477
146	STOP	34185	185	DLOAD	41033
147	POKE	36589	186	RENUM	40442
148	CONT	34144	187	TAB(	21319
149	LIST	36522	188	TO	52809
150	CLEAR	34161	189	SUB	20180
151	NEW	33813	190	FN	16706
152	DEF	40065	191	THEN	54096
153	CLOAD	46804	192	NOT	20435
154	CSAVE	46722	193	STEP	21070
155	OPEN	47144	194	OFF	50259
156	CLOSE	46668	195	+	20946
157	LLIST	36516	196	-	19535
158	SET	47570	197	*	51013
159	RESET	47619	198	/	22736
160	CLS	47711	199	^	21321
161	MOTOR	47489	200	AND	52803
162	SOUND	47778	201	OR	20435
163	AUDIO	47839	202	>	21569
164	EXEC	46360	203	=	52881
165	SKIPF	47134	204	<	21718
166	DEL	40289	205	USING	20549

LISTING 2

```
7531              210      ORG
7531 9EA6          20 @START  LDX  >0A6
7533 3410          20      PSHS  X
7535 8E8AAB        20      LDX  #35467
7538 BF75C7        20      STX  @ADDRESS
753B 308D0096      20      LEAX  @DIM,PCR
753F 8D7F          20      BSR  @BASIC
7541 8EB051        20      LDX  #45137
7544 BF75C7        20      STX  @ADDRESS
7547 308D0094      20      LEAX  @DRAW,PCR
754B 8D73          20      BSR  @BASIC
754D 8EAAF8        20      LDX  #43768
7550 BF75C7        20      STX  @ADDRESS
7553 308D009F      20      LEAX  @GET,PCR
7557 8D67          20      BSR  @BASIC
7559 8EAAF3        30      LDX  #43763
755C BF75C7        30      STX  @ADDRESS
755F 8608          40 @BEGIN  LDA  #8
7561 B77634        40      STA  @COUNT
7564 7C760E        40 @LOOP1  INC  @X1
7567 7C7617        40      INC  @X2
756A 8D47          40      BSR  @ACT
756C 7A7634        40      DEC  @COUNT
756F 26F3          40      BNE  @LOOP1
7571 8608          50      LDA  #8
7573 B77634        50      STA  @COUNT
7576 7C7611        50 @LOOP2  INC  @Y1
7579 7C761B        50      INC  @Y2
757C 8D35          50      BSR  @ACT
757E 7A7634        50      DEC  @COUNT
7581 26F3          50      BNE  @LOOP2
7583 8608          50      LDA  #8
7585 B77634        50      STA  @COUNT
7588 7A760E        60 @LOOP3  DEC  @X1
758B 7A7617        60      DEC  @X2
758E 8D23          60      BSR  @ACT
7590 7A7634        60      DEC  @COUNT
7593 26F3          60      BNE  @LOOP3
7595 8608          70      LDA  #8
7597 B77634        70      STA  @COUNT
759A 7A7611        70 @LOOP4  DEC  @Y1
759D 7A761B        70      DEC  @Y2
75A0 8D11          70      BSR  @ACT
75A2 7A7634        70      DEC  @COUNT
75A5 26F3          70      BNE  @LOOP4
75A7 B6FF00        72      LDA  65280
75AA 817F          72      CMPA  #127
75AC 2C81          72      BGE  @BEGIN
75AE 3510          75      PULS  X
75B0 9FA6          75      STX  >0A6
75B2 39            75      RTS
75B3 308D0054      80 @ACT  LEAX  @PUT,PCR
75B7 8D07          80      BSR  @BASIC
75B9 308D006F      80      LEAX  @PLAY,PCR
75BD 8D08          80      BSR  @BASIC2
75BF 39            80      RTS
75C0 9FA6          90 @BASIC  STX  >0A6
75C2 A684          90      LDA  ,X
75C4 1CFE          90      ANDCC  #0FE
75C6 BD1234        90      JSR  01234
75C9 39            90      RTS
75CA 9FA6         100 @BASIC2  STX  >0A6
75CC A684         100      LDA  ,X
75CE 1CFE         100      ANDCC  #0FE
75D0 BDADBD       100      JSR  44477
75D3 39           100      RTS
        75D4 8C412831312C3131   130 @DIM  FCB  140,65,40,49,49,44,49,49,41,0
        75DE B522424D31352C31   140 @DRAW  FCB  181,34,66,77,49,53,44,49,53,78,85,52,78
        68,52,78,76,52,78,82,52,34,0
        75F5 B32831302C313029   150 @GET  FCB  179,40,49,48,44,49,48,41,196,40,50,48,44,
        50,48,41,44,65,44,71,0
        760A B4283132312C3931   160 @PUT  FCB  180,40,49,50,49,44,57,49,41,196,40,49,51
        49,44,49,48,49,41,44,65,44,172,0
        7622 B8224C3235355431   170 @PLAY  FCB  184,34,76,50,53,53,84,49,48,48,79,49,65,
        68,66,71,34,0
        760E                    180 @X1  EQU  @PUT+4
        7617                    180 @X2  EQU  @PUT+13
        7611                    180 @Y1  EQU  @PUT+7
        761B                    180 @Y2  EQU  @PUT+17
        7634 0000               190 @COUNT  FDB  0
        75C7                    200 @ADDRESS  EQU  @BASIC+7
        7531                    210      END  @START
```

Hex dump

```
7531   9E A6 34 10 8E 8A AB BF 75 C7 30 8D 0 96 8D
7540   7F 8E B0 51 BF 75 C7 30 8D 0 94 8D 73 8E AA
754F   F8 BF 75 C7 30 8D 0 9F 8D 67 8E AA F3 BF 75
755E   C7 86 8 B7 76 34 7C 76 E 7C 76 17 8D 47 7A
756D   76 34 26 F3 86 8 B7 76 34 7C 76 11 7C 76 1B
757C   8D 35 7A 76 34 26 F3 86 8 B7 76 34 7A 76 E
758B   7A 76 17 8D 23 7A 76 34 26 F3 86 8 B7 76 34
759A   7A 76 11 7A 76 1B 8D 11 7A 76 34 26 F3 B6 FF
75A9   0 81 7F 2C 81 35 10 9F A6 39 30 8D 0 54 8D
75B8   7 30 8D 0 6F 8D 8 39 9F A6 A6 84 1C FE BD
75C7   12 34 39 9F A6 A6 84 1C FE BD AD BD 39 8C 41
75D6   28 31 31 2C 31 31 29 0 B5 22 42 4D 31 35 2C
75E5   31 35 4E 55 34 4E 44 34 4E 4C 34 4E 52 34 22
75F4   0 B3 28 31 30 2C 31 30 29 C4 28 32 30 2C 32
7603   30 29 2C 41 2C 47 0 B4 28 31 32 31 2C 39 31
7612   29 C4 28 31 33 31 2C 31 30 31 29 2C 41 2C AC
7621   0 B8 22 4C 32 35 35 54 31 30 30 4F 31 41 44
7630   42 47 22 0 0 0 FF
```

LISTING 3

```
1 GOTO20
10 DIMA(10,10)
20 A=PEEK(25)*256+PEEK(26)+12
30 A=A+1 PRINT#-2,PEEK(A)," "; IF PEEK(A)<>0 THEN 30 ELSE PRINT#-2,CHR$(13):END

RUN

140    65    40    49    48    44    49    48    41    0
```

The sound barrier

David Hoadley explains how to make your Spectrum simulate a VU meter

The sort of programs most commonly advertised for the Spectrum are games. This is not surprising as sad to say people usually buy their Spectrum with games in mind.

Occasionally however some users manage to tear themselves away from blasting hideous alien hordes and sit down and write a program of their own. So one afternoon when the aliens had got the better of me yet again, I pulled the plug and after some thought, came up with the basis of this program.

It is written for those times with friends or relatives who, when shown your pride and joy will say, 'Very nice dear but what use is it?' One is usually confounded by this often asked question, and this program, I hope, will serve as a good demonstration of just what a Spectrum is capable of, even if it is not a program you use every day.

The idea of the program is to turn your ZX Spectrum into something loosely resembling a VU meter. Amazing huh? Basically what the program does is to identify on a scale of 0 to 255 the amplitude and frequency of sound coming in through the Spectrum's *Ear* socket. To use the program all you need to do is connect the *Ear* socket on a sound source to the *Ear* socket on your Spectrum.

It should be noted that the program will not work properly with a ZX printer connected — this causes a value of 255 to be *Poked* to the location where the value is stopped by the machine code every time the machine code loops thus making the display less than spectacular.

When you Run the program, you will see a box at the bottom of the screen, divided into two parts, with nothing much happening in them. In the upper part of the screen you will see a line creeping across.

Now for the spectacular bit. Switch your sound source on and, voila! If nothing has happened after you do this, first of all check that there is some sort of noise going into your Spectrum. Then try adjusting the tone and volume until some effect is visible on the screen. If not, you're in trouble (I suggest you check the listing carefully).

For those of you who have something appearing on your tv screens I will explain what is happening. The display in the top half of the screen provides a record of the last 255 values *Peeked* from location 23608 As this fills the screen it will clear itself and start again.

Now to the flashing bits at the bottom in the box. The one to the left simulates the Led VU meter found on many hi-fis nowadays. You will notice that, as the value gets above 0 on the scale the Led's will change to red. On the right a small magenta block will light up if the value gets high enough, showing that the music (or whatever) is particularly loud.

To make the program as fast as possible I have used a short 25 byte machine code routine which reads the value at the *Ear* socket and *Pokes* it to address 23608 — this may be familiar to those of you who have read Chapter 25 in the Spectrum manual. It is the address where normally the length of that annoying warning buzz is stored.

```
1 REM 1234567890123
4567890123456789012
34567890
2 INK 0  PAPER 7. C
LS
3 IF PEEK 23760<>33
THEN GO SUB 9000
4 LET b$="                    "
5 PRINT INK 7, PAPE
R 1,AT 0,0," VU ME
TER © D.A.Hoadley.
1983                 "
6 PLOT 0,30  DRAW 2
00,0  DRAW 0,-30  D
RAW 47,0  DRAW 0,30
  DRAW -47,0  PLOT
0,30  DRAW 0,-30
DRAW 200,0
7 PRINT AT 19,1,"-2
0  -10   0   10
20"
8 PRINT AT 19,26, I
NK 0, PAPER 4,"PEAK"
9 LET a$="██████████
██████████"
10 FOR n=0 TO 255
20 LET l=USR 23760
21 LET a=PEEK 23608
29 INK 1
30 PLOT n,87
40 DRAW 0,(a/4)
51 LET t=a/13
52 INK 0
60 PRINT INK 5,AT
20,1,a$( TO t)+b$(
TO (20-t))
61 PRINT AT 20,12,
OVER 1, PAPER 7, IN
K 2,""
80 IF t>14 THEN PRI
NT AT 20,26, INK 3,
PAPER 7,"▀▀▀▀"
81 FOR f=0 TO 3  NE
XT f
90 PRINT AT 20,26,"
    "
200 NEXT n  RUN
9000 FOR f=23760 TO
23784
9005 READ a. POKE f
,a  NEXT f
9010 DATA 33,56,92,
62,0,119,6,255,219,
250,254,255,40,1,52
,16,247,201,0,0,0,0
,0,0,0
9020 RETURN
```

The routine itself is *Poked* automatically by the program into a Rem statement at the beginning of the program (so don't miss it out to save those aching fingers). This should have more than 30 characters in it to allow plenty of space for the machine code. This routine is relocatable, so for those of you who wish to avoid the adverse effect the machine code has on the listing (when listing, use *List 2* to avoid this) you could easily *Poke* the machine code to somewhere else in memory. I prefer to keep my machine code routines in a Rem statement because it is easy to keep track of them. For anyone who is interested these are the mnemonics for the machine code.

```
LD HL (5C38)
LD A 00
LD (HL) A
LD B FF
IN A (FA)
CP FF
JR Z 01
INC (HL)
DJNZ —9
RET
NOP (x7)
```

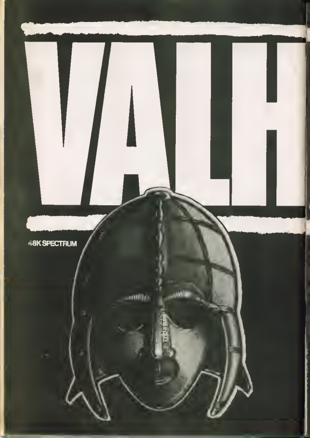
This loops round 255 times and increments 23608 each time something comes in through the *Ear* socket — giving the final number at 23608 each time the routine is called from Basic by line 20. Here is a blow-by blow account of which line does what.

1 REM where machine code is stored
3 Checks to see if machine code has been POKEd. If not it GOSUBs 9000
6-8 Draw box label it
9 Assigns a$ the string which is used in the LED simulator (20 graphic 5's)
10 Start loop
20 Call machine code
21 Let a = value returned at EAR socket stored in 23608
30-40 Plot and draw upper part of display
51 Reduces PEEKed value
60 Slices and prints a$ according to value returned at 23608
80 Prints bar if peak is reached (4 inverse graphic 3's)
81 Pause
90 Print over bar
200 Next part of loop. Start again
9000-9020 POKES machine code to 23760 onwards

You could improve on this program in quite a few ways. How about a real dial to show the value instead of the Led? You would use the same method used in the manual to produce the 'clock' or maybe a digital reading of the value printed somewhere or other.

If you wanted to be really ambitious, you could convert the whole program into machine code. This would improve its speed and accuracy a great deal because as it stands, the program misses bits of music each time it prints up the Led and draws the top half of the screen.

The machine code routine could be incorporated into many different programs which use sound analysis of some kind. A program could be written that would only respond to certain sounds coming in at the *Ear* socket for security reasons — there's an idea. ■



VALH
48K SPECTRUM

Video, video

***David King** presents the second and final part of his computer captions for videos program*

Last week we looked at two procedures with which we can easily calculate screen positioning in terms of *Print Tab (X,Y)* These are incorporated in listing 3 though lines 390 490, 600 and 610 will need modification Apart from one or two short procedures to aid the presentation and flow of the program the main procedure is *Procsaver* which is defined at lines 960-1410

Programs are normally *saved* in a shortened form with Basic commands stored as reduced tokens The *Spool* command on the BBC Micro and Acorn Electron causes whatever next appears on the screen to be *Saved* on to cassette as Ascii characters This means that if you Run the program in listing 1, line 20 activates the *Spool* command and what is printed on the screen by line 30 is stored for posterity on tape or disc as an Ascii file Line 40 finishes the facility

If we engage the *Spool* command and then print a syntactically correct program on to the screen, that program is *Saved* on to cassette Again the program is *Saved* as an Ascii file so it cannot be reloaded with the *Load* or *Chain* commands Listing 2 shows now variables can be passed into the Ascii program

When the program has Run and the Ascii file has been recorded, type *New* (or the programs will merge) then *Load* the file by typing **Exac Demo2"* + *<Return> key* Ignore error messages and Run the program The program can now be *Listed*, *Saved*, *Loaded* and Run as any Basic program In line 80 *Print Chr$34* has to be used to make quotation marks appear on the screen The program uses easy variable names to aid typing It will probably save time if you define the red keys to print them, eg **Key2* key-pressed

The principle behind listing 2, where we make a complete listing appear on-screen then record it, is extended in *Procsaver* Lines 1010-1220 print the main body of the generated program on to the screen Lines 1230-1290 display your data within the new program

The program contains brief but helpful instructions, and operates as follows

(1) Position cursor to calculate vertical position
(2) Select double or single height for characters
(3) Type in line of text
(4) Do you want a reveal delay after this line of text?
(5) Do you want the next page, same page or to exit this stage of the program?
(6) Save the generated program on to cassette or disc

If you have the 1 2 Rom fitted you can insert teletext colour codes into the text by pressing Shift and a red key However you will get the clearest pictures if you use white lettering on black using the video out socket on the computer connected to "video in" on the video recorder ■

David King
Computer Based Learning Centre
Dudley College of Technology
Dudley
West Midlands
DY1 4AS

Listing 1

```
10 REM first demo  DK
20 *SPOOL"Demo1"
30 PRINT"Dudley College of Technology"
40 *SPOOL
50 END
>
```

Listing 2

```
10 REM second demo  DK
20 INPUT"What is your name",Name$
30 *SPOOL"Demo2"
40 PRINT"10 MODE 7"
50 PRINT"20 FOR col = 129 TO 138"
60 PRINT"30 P.'CHR$(col);";
70 PRINTCHR$34;Name$;" is a fine person.";
CHR$34
80 PRINT"40 NEXT col"
90 PRINT"50 END"
100 *SPOOL
110 END
```

Listing 3

```
10 REM D King BCT September 1983
20 MODE7:PROCinit
30 ONERROR PROCescape:GOTO40
40 MODE7:PROCDBL(7,1,"MODE 7 TELETEXT GRAPHICS")
50 PRINT "If you require coloured text, you must" "insert the colour control code using"
60 PRINT"the red keys.  The colour codes are  "given on page 154 of the User Guide,"
70 PRINT"or you can use the BCT own ROM red key" "chart "  "The colour codes use one letter space "
80 PRINT "You can use double height letters.
90 PROCspace:page=1:line=1:CLS
100 PRINTTAB(1,8)"cursor UP/DOWN  RETURN when finished"
110 PROCpos_curs
130 PRINTTAB(0,0)"   DOUBLE HEIGHT LETTERS? Y or N only"
150 *FX15,0
190 key_pressed$=GET$
150 IF key_pressed$<>"Y" AND key_pressed$<>"N" THEN 150
160 Double$(line)=key_pressed$
170 PROCline(39)
180 PRINTTAB(0,0)"    Next page? (Y,N,eXit)"
190 *FX15,0
200 key_pressed$=GET$
210 IFkey_pressed$="N"THEN line=line+1:GOTO100
220 IFkey_pressed$="X"THEN line=line+1:GOTO270
230 IFkey_pressed$<>"Y"THEN 190
240 page=page+1:line=line+1
250 X(line)=99:Y(line)=0:words$(line)="0":Pause$(line)="N":Double$(line)="N":line=line+1
260 CLS:GOTO100
270 X(line)=99:Y(line)=0:words$(line)="End":Pause$(line)="N":Double$(line)="N"
280 PROCcct:ONERRORGOTO300
290 GOTO330
300 VDU7:*SPOOL
310 PROCescape
320 PROCsaver
330 CLS:PRINT   "Do you want to use the program again?"  "   Press Y or N only"
340 key_pressed$=GET$
350 IFkey_pressed$="N"THEN PROCend:END
360 IFkey_pressed$<>"Y"THEN340
370 RUN
380 REM  Define PROCEDURES
390 DEFPROCpos_curs:PROCcursor("ON")
400 X=4:Y=10:GOTO450
410 key_pressed=GET
420 IFkey_pressed=138THENY=Y+1:IFY>24THEN Y=24:VDU7
430 IFkey_pressed=139THEN Y=Y-1:IFY<1THEN Y=1:VDU7
440 IFkey_pressed=13 THEN460
450 PRINTTAB(X,Y);:GOTO410
460 X(line)=X:Y(line)=Y
470 ENDPROC
480 :
490 DEFPROCline(max):PROCcursor("OFF")
500 PRINTTAB(0,0)" ";:PRINTSTRING$(38," ")
510 PRINTTAB(0,0)"Words then RETURN":len=0
520 *FX15,0
530 key_pressed=GET
540 IFkey_pressed=13 THEN630
550 IF len>=max AND key_pressed <127 THEN VDU7:GOTO520
560 IF key_pressed=127 THEN words$(line)=LEFT$(words$(line),len-1):GOTO580
570 words$(line)=words$(line)+CHR$(key_pressed)
580 len=LEN(words$(line))
590 PRINTTAB(0,Y(line));" ";:PRINTSTRING$(39," ")
600 IF Double$(line)="Y" THEN PRINTTAB(0,Y(line)+1)" ";:PRINTSTRING$(39," ")
610 X(line)=(max DIV2)-(len DIV2):IFDouble$(line)="Y"THENPROCDBL(X(line),Y(line),words$(line)) ELSE PRINTTAB(X(line),Y(line));words$(line)
620 GOTO550
630 PRINTTAB(0,0)"  Delay (Y/N)      ";:PRINTSTRING$(20," ")
640 key_pressed$=GET$
650 IFkey_pressed$<>"Y"AND key_pressed$<>"N"THEN640
660 Pause$(line)=key_pressed$
670 ENDPROC
680 :
690 DEFPROCDBL(X,Y,words$)
700 PRINTTAB(X,Y)CHR$141;words$
710 PRINTTAB(X,Y+1)CHR$141;words$
720 ENDPROC
730 :
740 DEFPROCescape
750 CLS
760 IF ERR<>17 THEN REPORT:PRINTERL: ELSE PRINT  "ESCAPE key pressed "
770 PRINT  "Press X to exit" "or RETURN to cont"
780 *FX15,0
790 key_pressed=GET
800 IFkey_pressed=88 OR key_pressed=120 THEN PROCend:END
810 IFkey_pressed<>13 THEN780
820 ENDPROC
830 :
840 DEFPROCcursor(o$)
850 IFo$="ON"THEN o=255
860 IFo$="OFF"THEN o=0
870 VDU23;11,o;0;0;0
880 ENDPROC
890 :
900 DEFPROCspace
910 PRINT  :VDU132,157,131:PRINT"Press the SPACE BAR to continue  ";:VDU156
920 *FX15,0
930 REPEAT UNTIL GET=32
940 ENDPROC
950 :
960 DEFPROCsaver
970 CLS:PROCDBL(3,1,"PUT BLANK CASSETTE IN RECORDER")
980 PROCspace
990 CLS
1000 *SPOOL"CAPT"
1010 PRINT"10 MODE 7"
1020 PRINT"20 VDU23;11,0;0;0;0"
1030 PRINT"30 PROCspace"
1040 PRINT"40 READ P"
1050 PRINT"50 FOR page=1 TO P"
1060 PRINT"60 CLS"
1070 PRINT"70 REPEAT"
1080 PRINT"80 READ X,Y,words$,Pause$,Double$"
1090 PRINT"90 IF X=99 THEN 120"
1100 PRINT"100 IF Double$=";:PRINTCHR$34;"Y";CHR$34;" THEN PROCDBL(X,Y,words$) ELSE PRINTTAB(X,Y);words$"
1110 PRINT"110 IF Pause$=";CHR$34;"Y";CHR$34;" THEN PROCspace"
1130 PRINT"130 UNTIL X=99"
1150 PRINT"150 PROCspace"
1140 PRINT"140 NEXT page"
1150 PRINT"150 CLS:PROCspace:VDU23;11,255;0;0;0"
1160 PRINT"160 END"
1170 PRINT"200 DEFPROCspace:*FX15,0"
1180 PRINT"210 REPEAT UNTIL GET=32:ENDPROC"
1190 PRINT"250 DEFPROCDBL(X,Y,words$)"
1200 PRINT"260 PRINTTAB(X,Y)CHR$141;words$"
1210 PRINT"270 PRINTTAB(X,Y+1)CHR$141;words$"
1220 PRINT"280 ENDPROC"
1230 PRINT"500 DATA ";page;":REM no  of pages"
1240 L=505:line=1:FOR P=1TOpage:REPEAT
1250 PRINT" ;L;" DATA ";X(line);",";Y(line);",";CHR$34;words$(line);CHR$34;
1260 PRINT",";Pause$(line);",";Double$(line)
1270 line=line+1:L=L+5
1280 UNTIL X(line-1)=99
1290 NEXTP
1300 L=L+50:PRINT"";L;" REM BY BCT caption program"
1310 PRINT"";L+5;" REM generator  <C> dk 1983"
1320 *SPOOL
1330 CLS:PRINT   "Do you want to save another copy?"''TAB(0)"Press Y or N only"
1340 *FX15,0
1350 key_pressed$=GET$
1360 IFkey_pressed$="Y"THEN970
1370 IFkey_pressed$<>"N"THEN1340
1380 CLS:PRINT   "To recover the program you have just" "generated, follow the instructions" "at the end of this program "
1390 PROCspace
1400 ONERROR PROCescape:GOTO40
1410 ENDPROC
1420 :
1430 DEFPROCinit:d=60
1440 DIMX(d),Y(d),words$(d),Pause$(d),Double$(d)
1450 *FX4,1
1460 *FX11,0
1470 ENDPROC
1480 :
1490 DEFPROCend
1500 CLS:PRINT  "To recover generated captions program," "type NEW + <RETURN>" "then type *EXEC";CHR$34;"CAPT";CHR$34;
1510 PRINT" + <RETURN>" "or press red key f0 now."  "Program can then be LISTed, SAVEd and" "RUN as normal.":*KEY0 NEW M*EXEC"CAPT"|MLIST|M
1520 PROCnorm:ENDPROC
1530 DEFPROCnorm
1540 *FX4,0
1550 *FX12,0
1560 PROCcursor("ON"):ENDPROC
1570 DEFPROCcct
1580 dct$=CHR$157+CHR$132+" BCT "+CHR$129+"TV CAPTIONS program generator"
1590 CLS:PROCDBL(0,1,dct$)
1600 VDU28,0,24,39,3
1610 ENDPROC
```



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Art of the matter

***A Warman** presents a kaleidoscope program to demonstrate the use of hi-res graphics*

This program, for the CBM 64 plus Simon's Basic extension language cartridge, is designed to produce a series of aesthetically pleasing hi-resolution patterns. It demonstrates the superb graphics capabilities of the machine, as well as providing a simple introduction to some of the commands provided by Simon's Basic.

Notes

1000	Start of program
1020	Define a function to make random number generation easier
1040	Reset the high-resolution screen. Also selects random colours as well as the information about the line(s) to be drawn
1050	Main loop of the program. Cycles through to line 1110
1060	Draw the line(s) at the current position
1070	Test for any key being pressed to act as a command input
1080	If the key was 'S' then make a tidy exit from the program
1090	If the key was [SPACE] then pause the display until another key is pressed
1100	Any other key will cause a change of colour in the display
1110	Loop round to start of main program block
1120	When the program is to be stopped (by pressing 'S') execution jumps out of the loop to this line ready to tidy the screen and finish
1160	Procedure to draw the main line and its Mirror-images
1170-1200	Draw the line(s)
1210	Test to see if the 'X' value of the start of the line would fall outside of its quadrant. If it would change its direction
1220	If the start of the line has changed direction then change the colour as well
1230-1240	Test the 'Y' value of the start of the line
1250-1260	Test the 'X' value of the end of the line
1270-1280	Test the 'Y' value of the end of the line
1290-1320	Having established whether any change in directions have occurred calculate the next actual position of the line
1330	End of the line draw procedure
1370	Procedure to change screen colours
1380	87% chance of entirely new (ie, Blank) screen
1390	Otherwise simply change the current ink colour
1400	When colour changes are complete decide on the new plot type
1410	End of new colour procedure
1450	Procedure to change the colours on the screen WITHOUT changing the actual lines currently on display (This can make some lines disappear, others reappear in new colours!)
1460	Select the new colours at random
1470	End of procedure to select colours
1510	Procedure to clear screen and choose new positions/directions for the line(s)
1520	Choose random Border and Background colours
1530	Select high-resolution mode
1540	Choose the colours to draw in at first
1550	Select the first plot type (Exclusive-or)
1560-1590	Choose random co-ordinates to start the line(s)
1600-1620	Choose random directions for each of the end-points
1640	End of procedure
1680	Procedure to halt the display
1690-1710	Wait until no key is being pressed
1720-1740	Now wait until a new key is pressed
1750	Clear the dummy input variable so that the key press will not be treated as a command
1760	End of pause procedure
1800	Procedure to exit the program in a tidy fashion
1810	Restore the normal Text screen
1820	Set Black border and background
1830	Clear the text screen and select a text colour of green
1840	Halt the program
1850	End of the listing



```
1000 REM GRAPHICS DEMO
1010 :
1020 DEF FNR(X)=INT(RND(TI)*X)
1030 :
1040 EXEC SETUP
1050 LOOP
1060  EXEC DOLINE
1070  GET X$
1080  EXIT IF (X$="S")
1090  IF (X$=" ") THEN EXEC PAUSE
1100  IF (X$<>"") THEN EXEC NEWDISP
1110 END LOOP
1120 CALL EXIT
1130 :
1140 :
1150 :
1160 PROC DOLINE
1170 LINE X1,Y1,X2,Y2,CL
1180 LINE 159-X1,Y1,159-X2,Y2,CL
1190 LINE X1,199-Y1,X2,199-Y2,CL
1200 LINE 159-X1,199-Y1,159-X2,199-Y2,CL
1210 IF (X1+V1<0 OR X1+V1>79) THEN V1=-V1
1220 RCOMP:EXEC NEWDISP
1230 IF (Y1+V2<0 OR Y1+V2>99) THEN V2=-V2
1240 RCOMP:EXEC NEWDISP
1250 IF (X2+V3<0 OR X2+V3>79) THEN V3=-V3
1260 RCOMP:EXEC NEWDISP
1270 IF (Y2+V4<0 OR Y2+V4>99) THEN V4=-V4
1280 RCOMP:EXEC NEWDISP
1290 X1=X1+V1
1300 Y1=Y1+V2
1310 X2=X2+V3
1320 Y2=Y2+V4
1330 END PROC
1340 :
1350 :
1360 :
1370 PROC NEWDISP
1380 IF (RND(0)>0.87) THEN EXEC SETUP
1390 RCOMP:ELSE:EXEC NEWCOL
1400 CL=MOD(CL,4)+1
1410 END PROC
1420 :
1430 :
1440 :
1450 PROC NEWCOL
1460 MULTI FNR(16),FNR(16),FNR(16)
1470 END PROC
1480 :
1490 :
1500 :
1510 PROC SETUP
1520 COLOUR FNR(16),FNR(16)
1530 HIRES 0,0
1540 EXEC NEWCOL
1550 CL=4
1560 X1=FNR(80)
1570 Y1=FNR(100)
1580 X2=FNR(80)
1590 Y2=FNR(100)
1600 V1=FNR(3)+1
1610 V2=FNR(3)+1
1620 V3=FNR(3)+1
1630 V4=FNR(3)+1
1640 END PROC
1650 :
1660 :
1670 :
1680 PROC PAUSE
1690 REPEAT
1700  GET X$
1710 UNTIL (X$="")
1720 REPEAT
1730  GET X$
1740 UNTIL (X$<>"")
1750 X$=""
1760 END PROC
1770 :
1780 :
1790 :
1800 PROC EXIT
1810 NRM
1820 COLOUR 0,0
1830 PRINT CHR$(147);CHR$(30)
1840 STOP
1850 END

READY.
```



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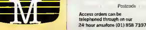
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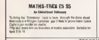
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Monitor

on Ace

These routines are for those who enjoy experimenting with the Ace First enter the Forth words on the listing carefully

The first routine BYTES prints out the contents in memory with the address the decimal contents of that address the contents in Hex and the Ascii character of that address It has two parameters the starting address and the finish address To have a peek at the Rom enter this

0 8192 Bytes

and the contents of the Rom will float up past your eyes Enter the words CODE and HALT on page 147 of the Jupiter Ace manual You can check that you entered HALT correctly by entering this

HALT HALT 4 + BYTES

and the contents of HALT will be seen

The next routine SEARCH gives the address of the first occurrence of a given byte So to find the address of the first asterisk (code 42) on the screen enter

42 9216 SEARCH (make sure there is already one on the screen)

If there is no asterisk in the addresses 9216 to 65535 (the top address) then the message NOT FOUND will appear if there is on the other hand, the address will be given You can try this on the Rom on your machine code routines anywhere (note that none of these routines are fast enough for use in games or suchlike)

The next routine STACK just prints out the contents of the stack out in hex Use it by typing STACK

The last routine S&R searches over a given area in memory and changes every specified byte to a given value

This routine uses four parameters the code to be altered, the code to change it to the start address and the finish address

Eg to change every space on the screen to an asterisk type

32 42 9216 9984 S&R

```
: BYTES
 SWAP 21 0 AT ." ADDRESS DEC. HE
X  CHR. " CR CR CR
 DO 21 2 AT I . 21 C AT I C@ .
21 13 AT 16 BASE ! I C@ . DECIM
AL
 21 20 AT I C@ EMIT CR CR CR
LOOP
 ;


0 VARIABLE TAR
 0 VARIABLE ADD


   SEARCH
ADD ! TAR !
 BEGIN ADD @ C@ TAR @ =
 IF
ADD @ 1+ ADD ! ADD @ -1 = UNTIL
 ." NOT FOUND"
 ;


   STACK
 15419 @ 15415 @ 12 +
OVER OVER -
 IF DO
I @ . 16 BASE ! .
 2 +LOOP ELSE DROP DROP THEN
 ;


 0 VARIABLE SEAR
 0 VARIABLE REP


  S&R
 4 ROLL SEAR ! 3 ROLL REP !
 SWAP DO I C@ SEAR @ =
IF
REP @ I C! THEN LOOP
 ;
```

Monitor
by Ralph Lorenz

Play

on Vic20

This program enables you to *Play* a melody using the numeric keys 1 to 8 and the 0 key as a rest. By using the 0 key you can syncopate your melody by using the "tone keys" (1-8) for the shortest notes that will occur in the melody and making up the time with the 0 key.

The computer will remember the melody played, (up to 300 notes in the unexpanded Vic). To leave the playing mode and enter the "playback" mode press 9.

Details will then be shown on the screen of how to operate in the playback mode. The melody will normally be replayed in the original voice used, but by selecting keys 1 to 4 during the replay you can change it. If the voicings are changed whilst a note is being played the note will continue on the same pitch whilst the new voice takes over the melody. This can be prevented by hitting key 0 to reset all the voices and then reselecting a voice.

The speed of playback can also be controlled by pressing + to increase the speed, or – to decrease it. When the replayed melody has finished the user can either replay it (using +), or he can return to the input mode (using –).

The current speed being used is displayed whilst the melody is being replayed along with the voicing code.

Full instructions are displayed at the appropriate times on the screen. Users with memory expansion can use many more inputted notes simply by altering the values in lines 40, 160 and 310.

Program notes

Lines	
50	Sets up variables, voice codes, and sets a voicing for immediate use when replaying sequence
100	Sets values of note codes to be assigned to the VIC keys
160-210	Accepts and stores the user's played melody
230-305	Instructs the user on how to operate playback
310-520	Replays the melody
530 to end	Gives new go or replay option

Interestingly, lines 270 and 600 are my method of error-trapping when waiting for a correct input (used here in *Get* situation but also applicable when using *Input*).

PROGRAM OF THE WEEK

```
10 REM VIC SEQUENCER
20 REM MUSIC MEMORY PROGRAM
30 REM R.BARTON
40 DIMP(300)
50 S1=36074 S2=36875 S3=36876 S4=36877 D=
   100 X=1
60 POKE36878,6
70 FORP=0TO8
80 READA(P)
90 NEXTP
100 DATA0,223,227,230,231,234,236,238,239
110 PRINT"VIC SEQUENCER"
120 PRINT"                    "
130 PRINT"PLAY MELODY ON NUMBER KEYS 1
   - 8 "
140 PRINT"PLAY KEY 0 FOR REST"
150 PRINT"AND KEY 9 TO ENTER    REPLAY
   MODE"
160 FORZ=1TO300
170 GETA$:IFA$=""THEN170
180 P(Z)=VAL(A$)
190 IFP(Z)=9THEN220
200 POKES1,A(P(Z))
210 NEXTZ
220 POKES1,0
230 PRINT"SEQUENCE STORED-"
240 PRINT"HIT P TO PLAY"
250 GETA$:IFA$=""THEN250
260 IFA$="P"THEN280
270 GOTO250
280 PRINT"SEQUENCE PLAYING"
290 PRINT"                    "
300 PRINT"USE + OR - TO CONTROL
   SPEED"
302 PRINT"VOICE CONTROL ON KEYS-"
304 PRINT"1-2-3-4
305 PRINT"KEY 0 RESETS VOICES"
310 FORZ=1TO300
320 IFP(Z)=9THEN530
330 IFX=0THENPOKES1,0:POKES2,0:POKES3,0:
   POKES4,0
340 IFX=1THENPOKES1,A(P(Z))
350 IFX=2THENPOKES1,A(P(Z)):POKES2,A(P(Z))
360 IFX=3THENPOKES1,A(P(Z)):POKES2,A(P(Z))
   :POKES3,A(P(Z))
370 IFX=4THENPOKES1,A(P(Z)):POKES2,A(P(Z))
   :POKES3,A(P(Z)):POKES4,A(P(Z))
380 FORT=1TOD
390 NEXTT
400 FORT=1TO10:NEXTT
410 GETA$
420 IFA$="+"THEND=D-20
430 IFA$="-"THEND=D+20
440 IFD<0THEND=0
450 IFA$="0"THENX=0
460 IFA$="1"THENX=1
470 IFA$="2"THENX=2
480 IFA$="3"THENX=3
490 IFA$="4"THENX=4
500 PRINT"SPEED "D
510 PRINT"VOICE "X
520 NEXTZ
530 PRINT"END OF SEQUENCE"
540 PRINT"                    "
550 PRINT"HIT + FOR REPLAY OR"
560 PRINT"- FOR NEW RUN"
570 GETA$:IFA$=""THEN570
580 IFA$="+"THEN280
590 IFA$="-"THEN110
600 GOTO570
```

Play
by Richard Barton

Pontoon

on ZX81

This is a version of pontoon for the 16K ZX81 The idea of the game is to score as high as possible up to 21 This is achieved by twisting until you have a high score Stick by pressing the letter L

The computer will always achieve a score between 15 and 21 so there is no point in sticking on less than 15 A five card trick means you win the game automatically. Also, if you score too many (more than 21), then you lose the game automatically 21 exactly is pontoon You must win five games before the computer to win the match.

```
  6 REM PONTOON
 10 LET ZX=0
 16 LET YOU=0
 30 LET T=0
 40 LET Y=0
 50 LET E=0
 52 PRINT AT 0,6,"PONTOON"
 54 PRINT AT 2,2,"ZX=",ZX
 60 PRINT AT 2,15,"YOU=",YOU
 90 PRINT AT 4,0,"PRESS L TO ST
ICK"
 100 PRINT "PRESS NEWLINE TO TWI
ST"
 102 LET E=E+1
 110 PRINT "CARD NUMBER ";E
 120 INPUT A$
 130 IF A$="L" THEN GOTO 300
 134 LET T=INT ((RND*9)+1)
 140 LET Y=Y+T
 160 PRINT AT 6,0,"YOUR CARD WAS
A ";T
 170 PRINT AT 10,0,"YOU HAVE ",Y
 172 IF Y=21 THEN GOTO 200
 174 IF Y 21 THEN GOTO 220
 176 IF Y 21 AND E=5 THEN GOTO 2
40
 175 GOTO 52
 200 PRINT AT 12,0,"WELL DONE-PO
NTOON"
 210 GOTO 300
 220 PRINT AT 12,0,"BAD LUCK-YOU
MANY"
 222 PRINT AT 16,0,"ZX WINS"
 224 PAUSE 500
 225 GOTO 362
 240 PRINT AT 12,0,"EXCELLENT-FI
VE CARD TRICK"
 250 PRINT AT 16,0,"YOU WIN
 252 PAUSE 500
 254 GOTO 364
 300 LET X=INT ((RND*6)+15)
 310 PRINT AT 14,0,"ZX SCORED ";
X
 320 IF X>Y THEN PRINT AT 16,0,"
ZX WINS ",X,"-",Y
 330 IF X<Y THEN PRINT AT 16,0,"
YOU WIN ",Y,"-",X
 340 IF X=Y THEN PRINT AT 16,0,"
ITS A DRAW"
 344 PAUSE 500
 345 IF X=Y THEN GOTO 370
 350 IF X>Y THEN GOTO 362
 360 IF X<Y THEN GOTO 364
 362 LET ZX=ZX+1
 363 GOTO 370
 364 LET YOU=YOU+1
 370 IF ZX=5 THEN GOTO 400
 380 IF YOU=5 THEN GOTO 450
 382 CLS
 390 GOTO 20
 400 PRINT AT 10,0,"ZX WINS THE
MATCH ",ZX,"-",YOU
 420 STOP
 450 PRINT AT 10,0,"YOU WIN THE
MATCH ",YOU,"-",ZX
 460 STOP
```

Pontoon
by G Burrows

Strings

on BBC

This program is a simulation of those graphs that you used to draw in primary school using many straight lines to build up curves as if using strings The program firstly draws three separate graphs before displaying them superimposed on each other

```
 10 REM------------------------------------------
 20 REM                 STRINGS
 30 REM          BY   J.D CHURCH
 40 REM------------------------------------------
 50 MODE4
 60 PROC_1:PROC_WAIT:PROC_2:PROC_WAIT:PROC_3:PROC_WAIT:PROC_1:PROC_2:PROC_3
 70 END
 80 CLS
 90 ENDPROC
100 DEFPROC_WAIT
110 TIME=0
120 IF TIME <200 THEN 120
130 CLS
140 ENDPROC
150 DEFPROC_1
160 FOR X=1140 TO 140 STEP -30
170 MOVE X,12:DRAW 140,(1152-X)
180 MOVE X,12:DRAW 1140,(X-120)
190 MOVE X,1012:DRAW 140,(X-120)
200 MOVE X,1012:DRAW 1140,(1152-X)
210 NEXT X
220 ENDPROC
230 DEFPROC_2
240 FOR X=0 TO 500 STEP30
250 MOVE 640,(512+X):DRAW(1140-X),512
260 MOVE 640,(512-X):DRAW(1140-X),512
270 MOVE 640,(512+X):DRAW(140+X),512
280 MOVE 640,(512-X):DRAW(140+X),512
290 NEXT X
300 ENDPROC
310 DEFPROC_3
320 FOR X=0 TO 500 STEP30
330 MOVE(640-X),(512-X):DRAW(140+X),(1012-X)
340 MOVE(640-X),(512-X):DRAW(1140-X),(12+X)
350 MOVE(640+X),(512+X):DRAW(1140-X),(12+X)
360 MOVE(640+X),(512+X):DRAW(140+X),(1012-X)
370 NEXT X
380 ENDPROC
```

Strings
by Jonathan Church

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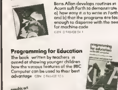


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3D Bar Graphs

on Spectrum

Although this program was written on a 16K Spectrum it could be adapted for use with the ZX81. It enables you to draw Bar graphs in 3D.

The subroutine in line 1000 produces the 3D effect. The program itself might make a useful subroutine in a longer program.

```
  10 BOPDER 1 INK 7 PAPER 1
  20 PRINT FLASH 1;AT 0,9;" BAR GRAPHS "
  30 LET C=0 LET X=0 LET Y=10 LET I=0
  40 INPUT "NUMBER OF 0ARS (1-10) ",0
  50 IF 8 <= 0 OR 0 > 10 THEN GOTO 40
  60 INPUT "PERCENTAGE OF 0AR (1-100) ";P
  70 IF P <= 0 OR P > 100 THEN GOTO 60
  80 FOR J= 0 TO P FOP K= X TO Y
  90 PLOT K,J
 100 NEXT K NEXT J
 110 PRINT AT 6,I,P
 120 LET X=X+25 LET Y=Y+25
 130 LET I=I+3 LET C=C+1
 140 GOSUB 1000
 150 IF C=B THEN STOP
 160 GOTO 60
1000 DRAW 5,5 DRAW 0 -P DRAW -5,-5
1010 DRAW -10,P DRAW 5 5 DRAW 10 0
1020 RETURN
```

3D Bar Graphs
by Haman Patel

Dump

on Vic20

This subroutine when run will list all variables that have already been set up except those that are used in the routine itself, so the main program should therefore not include any variables that are used in this routine.

To initialise the program use *Goto 60000*. If there are more than 20 variables the routine will wait until you press a key before printing the rest.

Program notes

Lines	
60000	Find start of variable area
60001-3	Is screen full?
60004-7	Which type of variable?
60008-9	Print out string
60010-11	Print out integer number
60012-17	Print out floating point number

```
60000 A=PEEK(45)+256*PEEK(46) C=0
60001 C=C+1 IFC<20THEN60004
60002 OETA$ IFA$=""THEN60002
60003 C=0
60004 IFPEEK(A)>127ANDPEEK(A+1)>127THEN60010
60005 IFPEEK(A)<120ANDPEEK(A+1)<120THEN60012
60006 PRINTCHR$(PEEK(A)), A=A+1 IFPEEK(A)=120THEN60008
60007 PRINTCHR$(PEEK(A)-120),
60008 PRINT"$=",CHR$(34), A=A+1 N=PEEK(A) A=A+1 L=PEEK(A) A=A+1 H=PEEK(A) SP=L+2
56*H
60009 FORL=SPTOSP+N PRINTCHR$(PEEK(L)), NEXT PRINT A=A+3 OOTO60001
60010 PRINTCHR$(PEEK(A)-120)CHR$(PEEK(A+1)-120)"%=", A=A+2 N=PEEK(A) IFN>127THEN
N=N-256
60011 N=N*256 A=A+1 N=N+PEEK(A) PRINTN A=A+4 OOTO60001
60012 IFCHR$(PEEK(A))="A"THEHEND
60013 PRINTCHR$(PEEK(A))CHR$(PEEK(A+1))"=", A=A+2 N=PEEK(A)-129 IFN<0THENN=N+128
60014 N=2↑N A=A+1 S0=PEEK(A) S4=1 IFS0>127THENS0=S0-120 S4=-1
60015 S0=S0*(1/120)*N A=A+1 S1=PEEK(A)*(1/(120*256))*N
60016 A=A+1 S2=PEEK(A)*(1/(120*256*256))*N A=A+1 S3=PEEK(A)*(1/(120*256*256*256)
)*N
60017 S0=(S0+S1+S2+S3+N)*S4 PRINTS0 A=A+1 OOTO60001

READY.
```

Dump
by Paul Lillington

OPEN FORUM

Pinball

on Spectrum

This game should work on the 16K machine It is a kind of pinball with a touch of Breakout because, in place of the usual flippers there is a bat which can be moved using keys 5 and 8 Points are scored when the ball hits a number

Program notes

20-40	Defines ball
100-120	Print playing area
135-250	Main game
500 530	Lose one ball
1000-1050	Game over

```
   1 REM ##############################
         #                            #
         #          PINBALL           #
         #                            #
         # © 1983 S.J. Bennett        #
         #                            #
         ##############################
  10 LET hs=0  LET s$="___"
  20 FOR n=USR "a" TO USR "a"+7
  30 READ a  POKE n,a  NEXT n
  40 DATA 0,60,126,e,e,e,60,0,0
  50 LET sc=0  LET li=3
  90 BORDER 0  PAPER 7  INK 9  F
LASH 0  BRIGHT 0  OVER 0  INVERS
E 0  CLS
 100 INK 1  PAPER 5  PRINT AT 5,
5;"[redacted]"  FOR n=6 TO 20
PRINT AT n,5;"[redacted]          [redacted]"  NEXT
 n
 110 PRINT AT 21,5;;"[redacted]
"
 120 FOR n=1 TO 9  PRINT AT INT
(RND*14)+6,INT (RND*9)+6, PAPER
6, INK 1,n  NEXT n
 130 LET bx=7  LET by=13  LET bx
1=1  LET by1=-1  LET x=6
 131 PRINT AT 1,12, PAPER 7; BRI
GHT 1, INK 1,"BALLS ",li
 133 PRINT AT 1,22, BRIGHT 1; PA
PER 7, INK 1,,"HIGH ",hs;AT 2,22
," BY ",s$
 135 LET a$=SCREEN$ (bx,by)
 140 IF a$<>" " THEN LET sc=sc+V
AL a$  BEEP .1,00  LET q=RND  LE
T w=RND  LET bx1=-(q>.5)+(q<.5)
 LET by1=-(w<.5)+(w>.5)
 150 PRINT AT bx,by,"[redacted]"
 160 LET paper=8  LET ink=1  IF
a$<>" " THEN LET paper=6  LET in
k=0
 170 PRINT AT 21,x-1, INK 2; PAP
ER 1," [redacted] ",AT bx,by, INK ink,
PAPER paper,a$
 180 IF bx<7 THEN BEEP .005,10
LET bx1=-bx1
 190 IF by>12 OR by<8 THEN LET b
y1=-by1  PRINT AT bx,8; INK 1;"[redacted]
",AT bx,15,"[redacted]". BEEP .005,10
 200 LET bx=bx+bx1  LET by=by+by
1
 210 LET x=x+(INKEY$="8" AND x<1
2)-(INKEY$="5" AND x>6)
 220 IF bx=21 THEN IF ABS ((x+0)
-by)>1 THEN GO TO 500
 230 IF bx=21 THEN BEEP .03,-10
 LET bx1=-bx1
 240 PRINT PAPER 7, INK 1,AT 1,1
, BRIGHT 1,"SCORE ",sc
 245 PRINT AT 5,5,"[redacted]"
 250 GO TO 130
 500 FOR n=0 TO -50 STEP -2.5. B
EEP .05,n  NEXT n
 505 LET li=li-1
 510 PRINT AT 1,12, PAPER 7, BRI
GHT 1, INK 1;"BALLS ",li
 515 PRINT AT 1,22, BRIGHT 1, PA
PER 7, INK 1,;"HIGH ",hs,AT 2,22
," BY ",s$
 520 IF li<=0 THEN GO TO 1000
 530 GO TO 100
1000 RESTORE 1010  FOR n=1 TO 15
  READ a,b  BEEP a,b  NEXT n
1010 DATA .1,2,.1,2,.1,4,.1,6,.1
,6,.2,10,.2,5,.1,3,.6,3,.1,3,.1,
2,.1,1,.1,0,.1,-1,.1,5,.1,0,.1,5
,1,3
1020 PRINT PAPER 7, INK 2,AT 15,
22, FLASH 1,"GAME", FLASH 0," ",
 FLASH 1,"OVER"
1030 IF sc>hs THEN LET hs=sc  IN
PUT "TYPE YOUR INITIALS ",s$  IF
 LEN s$>3 THEN GO TO 1030
1040 PRINT AT 1,22, BRIGHT 1, PA
PER 7, INK 1,"HIGH ",hs,AT 2,22,
" BY ",s$
1050 PRINT AT 3,3, INK 3, PAPER
9, FLASH 1,"Press ENTER to play
again"  INPUT LINE x$  GO TO 50
```

Pinball
by Steven Bennett

Microradio

GW6JJN

Dots and dashes

If you sit and patiently tune a short wave radio, sooner or later you will come across morse code Morse code consists of a series of seemingly random dots and dashes What you may be hearing is a radio amateur in some distant part of the world a weather station in Antarctica or even the seventh fleet How nice it would be to understand these exotic messages

There are two ways to do this Firstly you can learn morse and translate it yourself or secondly, use the micro to turn it all into English or French or Russian or whatever

In both these cases the microcomputer can help In learning morse, it can be a very patient tutor In receiving, it can be a sophisticated communications decoder It all depends on the program

To write a morse tutor program, one must tell the micro what the code is Data lines that look like

```
100 DATA A- B- C " D-
    E" F -
```

can all be read into a string array called as The various micros involved can then use the strong manipulation facilities available to find the first letter of each string then *Beep* or *Sound* or whatever a short sound of the ASCII code for is found or a longer sound if the "-" is encountered

The convention in morse is to make the dash sound three times longer than the dot The length of the spaces between is up to you and the more proficient you become, then the shorter the gap There are several morse learning programs on the market and I hope to be reviewing some soon

As for receiving morse by computer, this is more difficult but very worthwhile Molimerx Ltd supply a program for the TRS 80 that sends and receives morse very well under software control, as long as there is a clear signal With an interface that can filter out interference, the receiving of morse is simple and the world is yours

In order not to make this column too machine specific I hope to be giving the addresses of various micro-radio user groups most of whom publish a news letter with listings for specific micros This week I'll mention SARUG (Sinclair Amateur Radio User Group) Info from Paul Newman G4INP, 3 Red House Lane, Leiston IP16 4JZ Another group is RAMTOP and deals with a range of micros in radio Info from RAMTOP The School, Wellingborough Northants, NN8 2BX Anyone else who wants a mention please send me details

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike If you have any queries that you want answered hints and tips to share or topics that you would like to see covered write to Ray Berry Microradio *Popular Computing Weekly* 12-13 Little Newport Street London WC2R 3LD



Primeval man

To start another week of Spectrum Adventures I want to make an update of a previous Adventure Corner

In *PCW* No 17 (April 28), I took a look at *Knight's Quest*, which is from Phipps Associates Written by Mike Farley this program is, graphically anyway a little like *The Hobbit* using a split-screen display Text input from the player and information from the computer appears in the lower screen while in the top half a graphic representation of the present location appears

The program I found then is rather slow in response times, and the pictures not as attractive as those in *The Hobbit* (as well as taking up to 18 long seconds to be drawn in some cases!) They do the jbo well enough though The program does not aspire to independent action for ke characters either

To complement *Knight's Quest*, Phipps has released two more Adventures, *Magic Mountain* and *Pharoah's Tomb*, both of which once figured on an Adventure anthology tape for the ZX81 — and I believe that *Greedy Gulch* from the same tape has also made an appearance though I haven't seen this one as yet

The new programs follow the same format and in fact Farley probably wrote one main skeleton program and writes in different scenario as appropriate, like Scott Adams This is not to belittle however the hard work that obviously goes into these Adventures, nor the enjoyment to be had from them If you got on well with K's Q then rest assured that the new Phipps Adventures will enthrall you in the same way

Another new Adventure employing the split-screen technique is *Smuggler's Cove* written by John Keneally for Quicksilva This follows the good old traditional route and the graphics are rather simpler than those of *The Hobbit* — this has the advantage of making them very much quicker to appear than in either Phipps or Melbourne House None of the usual long wait for the pictures to be *filled* with colour

While only two-word commands are accepted by the computer, its responses are unusual and full of humour — Keneally makes full use of the smuggling theme, and you'll be called "Lubber" and "M Dear" in a heavy Robert Newton accent In fact, the whole thing is couched in mock Pirate/Cornish language throughout.

If you enjoy graphic/text programs of this type check but Richard Shepherd's latest offering *Isle Of Xaro* which also has some pretty graphics (not this time, in 3D) This is closer to the traditional form of Adventure than is usual with Shepherd, being written by a third party author

Devils Of The Deep is, however written by Shepherd himself, and follows the house style which players of *Superspy* and *Transylvanian Tower* will be familiar with As yet, I've only seen this one at Microfairs so I can't tell you much about the plot but the mechanics involve the player moving around a 3D representation of the sea-bed picking up weapons and treasures

To stray from the mainstream of Adventure for a while, we'll look at a program which its authors Microsphere, describe as dealing with "the greatest Adventure of all time" This is *Evolution* — these guys are starting with the BIG one!

You can play at being the Supreme Being (Earth Sector 3500 BC) and help man raise himself from the primaval ooze to civilisation There is a time limit shown on-screen, and a temperature scale

Starting off with plants, which you will need in order for oxygen to evolve, you choose which descendants of each branch you would like to create If you choose correctly at each stage, animals will eventually emerge, and similarly these must be nurtured Random disasters occur just to spice things up a bit — if you get in a real pickle you can even make a disaster happen It sometimes helps!

The program draws on a large database of all the branches of the plant and animal kingdoms to give you details of any species The basis of the Adventure if it can be called that, appears to be Microsphere's spreadsheet program, *Omnicalc* If I'm right *Evolution* would be the most attractive use I've yet seen for an electronic spreadsheet and a very attractive way to gain knowledge of the cause and effect of evolution

Management games of which *Evolution* could be called an example, are often lumped together with Adventures, and I suppose the pairing is as legitimate as any other *Dictator* from DK Tronics, is one such, available some time ago at £9, the program is now a lot cheaper, but minus the manual — the instructions are now on the cassette inlay, and you'll need a magnifying glass!

It's well worth looking at if you like this sort of thing You have just become President (pronounced Dictator) of the Republic of Ritimba Your goal is to rule as long as possible, while salting away as much as you can in your Swiss bank account This entails as any self-respecting Dictator knows playing off all sides against each other, ensuring that no one but yours truly ends up with the loot.

Your secret police who must at least on the surface be looked after more than any other faction are your eyes and ears and present you with reports throughout the game You must use these reports to gauge the feelings of all the groups who may bring you down It is up to your abilities at playing brinkmanship to appease those factions that are particularly restless at any given moment — but it helps to have a speedy helicopter on hand!

Dictator is a very complex program but the sound and graphics keep interest high, along with a great line in humour

Now to this week's crop of problems And to refer back to *Knight's Quest*, a number of people are getting in a bit of a tizzy in some parts of this infuriating Adventure The Dragon is a bit unfriendly — but you may find that he is merely hungry

Others are lost in the deserted waste land I've been there myself and try to avoid it now — but I'm not sure if it has a purpose Getting on to the Secret Ledge, and avoiding the Giant are other problems If you've completed the Adventure and fancy imparting your knowledge to others — you know what to do!

Meanwhile back at the Dragon 32 Elaine Chan of Chester is having trouble with *Dragon Mountain* Can you tell her how to give commands concerning torches and dark rooms (I should think one would lead to the other), and also, she would like to know the secret of the Spell Book

A couple of weeks ago I mentioned a Adventurers who asked if there were any good programs for the Vic20 apart from the ubiquitous Scott Adams Adventures Graham Moss writes to me from Ipswich to tell me of a game for the Dragon soon to be released by Martech This will be called *The Quest Of Merravid*, which Martech say has quite a sense of humour Apparently the game involves travelling around the land of Thargon, the player trying to piece together a suit of armour before doing battle with a nasty Dragon This is the first in a series of programs which will also be available for the Commodore 64

Next week I will be looking at *Quest* the new Adventure from Hewson Consultants, but in the meantime has anyone a solution to *The Castle* Bug-Byte's new Adventure?

This series of articles is designed for novice and experienced Adventurers alike Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge Adventure Corner *Popular Computing Weekly* 12 13 Little Newport Street London WC2R 3LD



WISHFUL THINKING

Kevin Guerrio of Hammerton Road Bromley Kent writes

Q **Could you please explain why on my Vic20 when using the command *Fre(0)* along with the command *Poke* 56, 144 I get the result 32758? Is this the true figure of unused bytes on my unexpanded Vic, or is it just wishful thinking on behalf of my computer? I have no reference guide so I do not know what *Poke* 56, 144 does.**

A I am afraid that you have not found a mysterious way of increasing the memory available on your Vic, what in fact you are doing is *Pokeing* into the upper part of the two byte number that keeps track of the end of the memory. Obviously by changing the value of this pointer you can change the *Frequency* value returned with the *Fre* command. In fact, you can even have minus memory. Try this

```
10 FOR A = 1 TO 180
20 PRINT
30 FOR B - 0 TO 180  NEXT B
40 POKE 56 A
50 PRINT FRE(0),A
60 NEXT A
```

Line 20 is only for clarity and line 30 gives you a chance to actually read what is coming up on the screen. Just press *Break* to stop the program.

VIDEO OUTPUT

M Wright of Dundas Street Spennymoor Co Durham writes

Q **I have a Spectrum and my question is what sort of output is available on the video connection on the expansion port? As I am a TV engineer it would be possible for me to convert a conventional television to a monitor (either RGB or Composite Video).**

I can find nothing in the manual, or in any of the books on the Spectrum. Also when it comes to *Loading* and *Saveing* problems, it could be 'dirty mains supply' that is amplified by the cassette and so upset the recording.

A It is possible. You will need to use an isolation transformer and earth the chassis of the television set. Also depending on the design of the set you might need to use a video sync splitter. The actual section of the circuitry to cut the signal into is the I F circuits. Disconnect the last stage of the I F section and route the signal into the video amp instead using a capacitor to control the voltage.

The signal from the video connection is one volt peak to peak at 75 ohms.

SCHOOL PROGRAMS

Stephen Piper of Orchard Avenue Ashford Middlesex writes

Q **I am a Dragon 32 owner and so far I am quite pleased with it. One of the reasons that I bought this particular computer was that I thought a lot of educational software would become available for it, as with the Vic20. But as yet I cannot find anything suitable. I am currently starting courses for my 'O'-levels, and I wondered if you could tell me of a company that might be releasing some soon.**

A Unfortunately you do not say what O-levels you are taking, so I do not know what exactly you are looking for. Educational software lags behind games software by six to nine months, certainly that was the case with the Spectrum and to a lesser extent the BBC. I think we will be seeing a lot more educational software for the Dragon by Christmas. The Dragon suffers somewhat by not being one of the micros recommended in schools. I hope that this scheme will soon be extended to include the Dragon, and the Commodore 64.

However there are some software houses with O-level material for the Dragon: Micro-De Bug Consultancy 60 Sir Johns Road Selly Park Birmingham B29 7ER (O-level or CSE revision in Physics, Maths and Biology as well as general knowledge and general spelling). Garland Computing of 35 Dean Street Plymouth PL9 (programs to test the verification of Ohms Law and the principles of direct current motors). Among others you can get are French Verbs from Premier Microsystems 208 Croydon Road Anerley London SE20 7XY and a general revision package from Tiger Software Dept D2 Devonshire Street Monkwearmouth Tyne and Wear.

HI-RES ZX81

J Killean of Forest Road, Walthamstow London E17 writes

Q **I still use a ZX81 because I have found it very easy to learn on. I was going to get a graphics Rom for it, but now a friend tells me that there is a High Resolution graphics tape available that is just *Loaded* like a normal program. Is this true, and, if so, where can I get it and how much does it cost?**

A For a supposedly out of date and outmoded computer the ZX81 is still doing remarkably well. The hi-res tape you want will give you the same screen as the Spectrum 256 × 192. It takes up less than 1K of Ram and costs £5 95. You can get it from Computer Rentals, 140 Whitechapel Road, London E1.

DRAGON DUMP

P L Sturgess of Wickhurst Lane Broadbridge Heath Horsham Sussex writes

Q **Please can you advise me on how to transfer screen graphics from my Dragon 32, on to a TRS 80 DMP1000 printer.**

I am anxious to write and transfer symbols like scout badges for notepaper and headings. I assume that it would take the form of some sort of Hi-Res screen dump, but writing it is beyond my computing powers at the moment.

A There is a solution. Caveman Computers do a program that will dump Hi-Res graphics on to your DMP100 in any of the two colour modes. The tape costs £7 95 and is available from Caveman Computers The Cave House 55 Iona Road Windy Nook Gateshead Tyne and Wear.

[redacted]

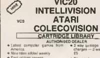
I have had many letters recently about ports and interfaces — a lot of people want to know what to look out for if they are thinking of buying a computer.

A port is essentially the same thing as an interface: both allow your computer to be connected with and communicate to, other pieces of equipment, usually printers but also robots, digital tracers etc.

The two most common ports are the RS232 serial port and the Centronics parallel port. A serial port passes information (data) 1 bit at a time whereas a parallel port passes it 1 byte (8 bits) at a time. Theoretically therefore, a centronics port should be faster. However since most printers can only handle up to 80 characters a second, the practical differences are negligable.

Many computers will be equipped with one or even both of the above ports but don't be misled by a phrase like 'Centronics type': this might mean that the port lacks some data lines important for some purposes — find out exactly what you will need and check the specifications. I should add that both the Spectrum and the ZX81 lack such ports (although you can buy them as add ons) and yet they have still sold well.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, 12-13 Little Newport Street, London WC2R 3LD.


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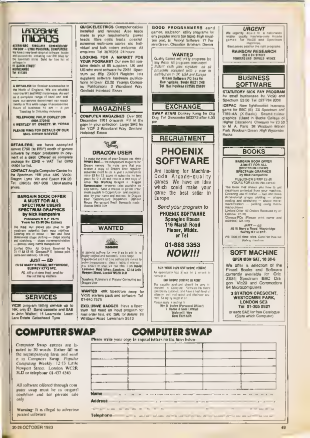
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* *The Working Dragon 32. It's a good one.* PERSONAL COMPUTER NEWS — 20 MAY 83

* *'The style of The Working Commodore 64 is easy to follow and informative.* PERSONAL COMPUTER NEWS — 18 AUGUST 83

* *Commodore 64 Machine Code Master is a truly useful book for the machine code programmer — and its easy to read as well. It is impossible to overpraise.* PERSONAL COMPUTER NEWS — 25 AUGUST 83

* *'There clearly is a need for books like The Working Dragon 32 which provides more than just games.* PRACTICAL COMPUTING — SEPT 83

* *Blind Alley is simply madly addictive. It is bound to be hugely popular.* WHAT MICRO — JULY 83

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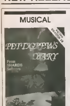
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NEW RELEASES

MUSICAL



Pettigrews Diary is a 90K adventure game for the Dragon 32. The game is divided into three sections The Burning farmhouse, London Frolics and European Trek, the first and last of which are illustrated with hi res graphics.

A musical score accompanies the various scenes which take you from the English countryside via London to Europe as you try to unravel the secrets of the mysterious diary.

The program comes with a set of instructions to guide you through the adventure.

Program *Pettigrews Diary*
Price *£7.95*
Micro *Dragon 32*
Supplier *Shards Software, 189 Eton Road, Ilford, Essex IG1 2UQ*

ALIEN

The next batch of games from Virgin will soon be ready. The company will be covering Spectrum, BBC B, Commodore 64 and TI99/4A.

Quetzacoatl is a graphics adventure which Virgin says is one of their best Spectrum releases yet — they are also proud of *Falcon Patrol* for the 64, an air battle game with 3D graphics.

On the BBC there is *Microbe*, a sophisticated shoot em up game with multi levels and impressive graphics.

A gigantic alien is threatening earth — the only way to destroy it is via bacterial warfare. You must fight through its bodily defences with your microbes until it weakens and dies. The program is by Simon Birrell who is maintaining his insect obsession with this release — his previous one was *Bug Bomb*, also on the BBC.

Program *Microbe*
Price *£7.95*
Micro *BBC B*
Supplier *Virgin Games, 61 Portobello Road, London W11*

BLISS

The great thing to my mind about *Mad Martha* was that it proved that virtually anything could be the subject of an adventure game, ie, that they didn't all have to involve swords and rings of powers.

Fans of the "non dramatic" or "kitchen sink" adventure game will be glad to hear that *Mad Martha II* is on its way.

The tremulous Henry seems to have patched up his marital differences with Martha who (I suppose) has been let out of Holloway after her vicious assault — they go on holiday to Spain with their son Arbuthnot. Now read on.

Henry has built up a steamy pen pal relationship with an exotic beauty and is just waiting for a chance to escape from Martha's clutches for a few moments of bliss with his paramour.

The problem is that he is constantly under the watchful eye of Manuel, Martha's Spanish waiter cousin who can't speak English.

Sounds like a winner.

Program *Mad Martha II*
Price *£6.95*
Micro *Spectrum 48K*
Supplier *Mikrogen, 1 Devonshire Cottages, London Road, Bracknell, Berkshire RG12 2TQ*

CLASSROOM

Micro Concept is a software company dedicated to the professional implementation of good educational software ideas from teachers. All its programs are intended for use in the classroom by teachers with no knowledge of programming.

The idea is that whilst teachers may (sometimes) know how to teach, they seldom know how to write good programs.

Micro Concept is covering a wide range with programs on bearings, addition and one that I particularly noticed, prisms.

This latter program uses a graphic display of a prism to explain surface areas and the various differing calculations that are required, depending on whether it has a square, triangular or cylindrical base.

Program *Prisms*
Price *£7.50*
Micro *BBC B*
Supplier *Micro Concept, 22 Allenby Avenue, Grimsby, Humberside*

CLONED

After the highly abstract *Knot in 3D*, New Generation Software has returned to a more conventional kind of game with *Corridors of Genon*.

You must find your way through 30 circular corridors and deactivate the computer of Genon. Your way is barred by various doors, each of which require a three digit code before they can be opened. The computer can also defend itself using the guardian of the corridors, Bogul. Bogul does not kill you at this point but if he catches you, your ability to discover the door codes is impaired.

If you manage to find the computer you can destroy it by discovering its own special three digit code (a sort of mini mastermind game). Then of course you must escape — not easy because Bogul has cloned and should one of him find you even once — you are dead.

I should stress that fans of New Generation's other games are not likely to be disappointed; all the corridors (and Bogul's nose) are done with the usual impressive 3D effects.

Program *Corridors of Genon*
Price *£5.95*
Micro *Spectrum 48K*
Supplier *New Generation Software, 16 Brendon Close, Oldland Common, Bristol BS15 6QE*

SCREEN

The Spectrum's screen display with 32 characters per line is limited for many purposes.

Myrmidon Software's *Micro-print* gives you extra Basic commands to use either 42 or 51 characters — a total of 1,224 characters per screen.

The system is simple to use, requiring only Basic instructions. The program is intended to be particularly useful for those who use their computers to create displays or who require a great deal of text on one screen.

Program *Micro print 42/51*
Price *£5.00*
Micro *Spectrum 16/48K*
Supplier *Myrmidon Software, PO Box 2, Tadworth, Surrey KT20 7LU*

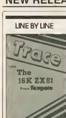
SINGLE KEY

BBC owners — now you can turn your micro into a Spectrum! Actually this slightly bizarre objective is not quite so silly as it sounds for what we are talking about is single key entry.

Clares has a program which will give you the standard basic words via single key presses — just like a Spectrum. The program, *S Key*, caters for both Basic I and Basic II on the one tape.

Program *S Key*
Price *£5*
Micro *BBC 32K*
Supplier *Clares, 222 Townfields Road, Winsford, Cheshire CW7 4AX*

LINE BY LINE



A Trace facility is being included on more and more of the new computers that are being launched — the ability to step through your program following it line by line is even more useful to the novice programmer than say a Renumber facility

However most of the current best selling micros don t have this facility Consequently you have to buy it as a utility Texgate who has already launched a variable speed Trace for the Spectrum has now converted it for the ZX81, which it is worth noting is still selling better than some other more glamorous machines

Program *Trace*
Price *£5 95*
Micro *ZX81 16K*
Supplier *Texgate Computers*
14 Brook Lane
Corfe Mullen
Dorset BH12 3RD

MUSIC BIZ

Personally I ve never been that impressed by simulations of football or cricket simply because I m not interested in the subjects For those of us who are not sports fans there is a chance to simulate a different kind of enterprise — the pop business

In *Top of the Pops* you own a record company and must quite simply produce best selling records and make a lot of money — unlike the real pop business, you are not interested in the quality of your product

Up to 10 people can play deciding how much to spend on promotion and watching the fate of their records in the all important chart

The program supports a printer and can be saved on tape should you wish to take a break from wheeling and dealing at any point

Program *Top of the Pops*
Price *£4 99*
Micro *Vic20 (+8K)*
Supplier *Sophisticated Games*
27 Queens Road
Keynsham
Avon BS18 2NQ



WHO DUNNIT

Murder at the Manor is a graphical adventure game from a new company — Gemtime

Like *The Hobbit* it is capable of sophisticated sentence analysis so that for example you can fight the butler with the brick" and interrogate the characters

Each play of the game gives different clues and a different murderer The game operates on its own time scale — at the end of each day night will fall and everything becomes more difficult and dangerous

The game has over 110 different locations and the graphics are very nearly of *Hobbit* quality Highly recommended

Program *Murder at the Manor*
Price *£6 95*
Micro *Spectrum 48K*
Supplier *Gemtime*
16 Ben Ledi Road
Kirkcaldy
Fife KY2 5RP

ZENITH

One of the more interesting, general guides to computers and computing is *Electronic Life* by Michael Crichton

The author is perhaps best known for his science fiction novel *The Andromeda Strain* which was also made into a film



The book is arranged alphabetically into subjects like Buying a Computer, Hurting the Computer Printer and finally Zenith which comes to the philosophical conclusion that "Human beings will always have something else to do And so for that matter, will their machines "

Although there are programming tips and even a few programs I think it will be most interesting to those who are concerned about the philosophical and social significance of computers

Book *Electronic Life*
Price *£7 95*
Micro *General*
Supplier *William Heinemann*
10 Upper Grosvenor
Street
London W1X 9PA

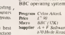
ATTACK

Just released for the BBC is *Cylon Attack* a sophisticated arcade game from A + F Software You are an interceptor pilot on board an earth supply ship — you must fight off the Cylon boards and send them back to their planet

The game features include launch and landing sequences, climb and turn radar fuel and lasers and, a good idea not adopted by most software houses, the opportunity to *save* and *load* high scores The game runs in 32K on all the BBC operating systems

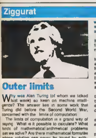


Program *Cylon Attack*
Price *£7 90*
Micro *BBC (32K)*
Supplier *A + F Software*
830 Hyde Road
Manchester M18 7JD



New Releases is designed to let people know what software is coming on to the market If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases Popular Computing Weekly 12 13 Little Newport Street London WC2H 7PP 3LD

Ziggurat



Outer limits

Why was Alan Turing (of whom we talked last week) so keen on machine intelligence? The answer lies in some work that Turing did before the Second World War, concerned with the limits of computation.

The limits of computation is a grand way of saying "What is it possible to calculate? What kinds of mathematical/arithmetical problems can we solve? Are there mathematical formulae whose solution can never be found by arithmetical means?" In fact the limits of computation, as an idea, involves far more.

Why did Turing (and many others) think it was so important to establish the limits of computation? If it were possible to establish what these limits were then it was possible to decide what were the limits to a calculating machine.

A calculating machine in this sense does not mean a calculator or even an electronic computer. It merely means some machine which can be used to perform calculations automatically.

"Automatically" is the key word. It means that the machine is instructed on what to do and goes ahead and does it. If a problem is outside the limits of computation then the problem cannot be solved automatically. The means of solving the problem which the machine follows automatically once instructed is called the algorithm.

If "intelligence" is outside the limits to computation then there cannot be an intelligent machine. Turing thought intelligence was not outside these limits, otherwise he would not have proposed his test.

Turing (and Alonzo Chuton independently) found that if a mathematical/computational problem could be expressed in a certain special form, then that problem was computable.

The special form was that known technically as "general recursive", but all we need to know for our purposes is that all conventional arithmetic is covered by the designation. If a function was general recursive then it was possible to solve the function by a method which had been specified in advance (the algorithm).

To illustrate what he meant by "computability" (ie something within the limits of computation) Alan Turing devised a hypothetical machine — the Turing machine.

The idea was to try to take any algorithm and turn the algorithm into a set of elemental acts. If sufficient of these elemental acts were performed Turing believed that that would be enough for any possible computation. If something could be computed the computation would be the result of many tiny separate little actions.

The Turing machine consisted of a device through which passed an infinitely long tape. On the tape there were distinct squares, and on each square there might be a symbol. The device could perform only four distinct actions.

(1) Erase a symbol on a square, possibly print a new symbol on the same square, and perhaps enter a new state of action.

(2) Move the tape one square to the right, and perhaps enter a new state of action.

(3) Move the tape one square to the left, and perhaps enter a new state of action.

(4) Stop.

There were sets of instructions for the machine ie, what and how to move between different states of action given the symbols on the squares. These sets of instructions were themselves computable and could be transferred on to the tape as a sequence of symbols.

To decipher the meanings of the set of instructions for machines (the algorithms) we could design a special set of instructions (an algorithm). We would have a "super algorithm" to analyse algorithms. The obvious question then becomes "Can the super algorithm analyse the meaning of the super algorithm?" More recently we might ask "Can a program to write programs write a program to write programs?"

Turing found the answer. The super algorithm could not analyse itself. The super algorithm is not computable, there are limits to computation.

What this means in practical terms is that there can be no such thing as a mechanical universal program generator.

The only universal program generator is a human being (or rather the collection of human beings known as humanity). Turing seemed to disagree with the implication that humans were not subject to his result, and so he invented his test to get around problems of computation.

The jargon for Turing's result is that there can be no Universal Decision Procedure. ■

Noria Allen

Puzzle

Double six

Puzzle No 78

If you examine an ordinary set of dominoes you will find that there are 28 dominoes ranging from a double-blank up to the double six. However in China it is not uncommon for sets to be enlarged further. For instance, by adding a further eight dominoes the set would then include all dominoes up to a double seven. Of course for the game to be playable successfully it would be necessary to include all permutations of numbers up to the highest double. In fact in China a standard set does contain no fewer than 55 pieces — that is dominoes up to a double nine.



Legend also has it that sets have existed which were even larger than this. One such story tells how the Princess Ling-Ling was given a set of golden dominoes by the Prince Chang on the occasion of their betrothal. This set was made from solid gold and the spots were inlaid diamonds — stones which had been cut by one of the Prince's distant ancestors in the 14th century.

The remarkable feature was that the number of diamonds used was exactly equal to the year (by Western calculation!) in which this betrothal took place.

How many dominoes were there, and what was this date?

Solution to Puzzle No 73

As a six digit square must have a square root in the range 317 to 999 the program tests every number N to check if it has this peculiar property.

```
10 FOR N = 317 TO 999 20 LET S = N * N 30 LET S$ = STR$ S 40 LET T = VAL (S$(1 TO 3)) + VAL (S$(4 TO 6)) 50 IF T = N THEN PRINT N S 60 NEXT N
```

Only one other number can be found with the characteristic that the sum of its two three-digit halves is equal to its square root. That number is 494209 = $703^2 = (494 + 209)^2$

Winner of Puzzle No 73

The winner is Alexander Webster, Reid Street, Burnbank, Hamilton, Lanarkshire, who receives £10

Top 10

BBC*

1	(5)	Planetoids	(Acornsoft)
2	(1)	Snapper	(Acornsoft)
3	(6)	White Knight Mk II	(BBC Soft)
4	(—)	Killer Gorilla	(Program Power)
5	(7)	3D Bomb Alley	(Software Invasion)
6	(—)	Wordwise	(Computer Concepts)†
7	(9)	Canyon	(BBC Soft)
8	(—)	Frogger	(A+F)
9	(—)	Countdown to Doom	(Acornsoft)
10	(10)	Demon Decorator	(Program Power)

*All Model B †Rom.

Dragon 32

1	(1)	Ring of Darkness	(Wintersoft)
2	(4)	Frogger	(Microdeal)
3	(8)	Cuthbert Goes Walkabout	(Microdeal)
4	(7)	Shuttle	(Microdeal)
5	(10)	Champions	(Peaksoft)
6	(5)	Mined Out	(Quicksilva)
7	(2)	Night Flight	(Salamander)
8	(3)	Talking Android Attack	(Microdeal)
9	(—)	Graphics System	(Salamander)
10	(—)	Franklins Tomb	(Salamander)

(Figures compiled by Boots & Co London)

Vic20

1	(1)	Arcadia	(Imagine)
2	(2)	Wizard and the Princess	(Melbourne House)
3	(4)	Grid Runner	(Imagine)
4	(6)	Sky Hawk	(Quicksilva)
5	(7)	Wacky Waiters	(Imagine)
6	(—)	Paratrooper	(Rabbit)
7	(—)	Pakacuda	(Rabbit)
8	(—)	Catcha Snatcha	(Imagine)
9	(—)	Panic	(Bug Byte)
10	(—)	Frantic	(Bug-Byte)

(Figures compiled by Boots & Co, London)

ZX81*

1	(1)	Flight Simulation	(Psion)
2	(2)	Space Raiders	(Psion)
3	(3)	Espionage Island	(Artic)
4	(4)	1K Games	(Artic)†
5	(5)	Fantasy Games	(Psion)
6	(6)	Defender	(Quicksilva)
7	(7)	QS Scramble	(Quicksilva)
8	(8)	Football Manager	(Addictive Games)
9	(9)	Ship of Doom	(Artic)
10	(10)	1K Chess	(Artic)

*Runs in 16K except where shown

(Figures compiled by Boots & Co)

Spectrum

1	(1)	Scrabble	(Psion)*
2	(3)	Jet Pac	(Ultimate)
3	(2)	The Hobbit	(Melbourne House)*
4	(4)	Flight Simulation	(Psion)*
5	(6)	Trans Am	(Ultimate)
6	(5)	Horace and the Spiders	(Psion/Melbourne House)
7	(8)	Horace Goes Skiing	(Psion/Melbourne House)
8	(6)	Super Spy	(Richard Shepherd)*
9	(10)	3D Desert Patrol	(Computer Rentals)
10	(7)	Ah Diddums	(Imagine)

(Figures compiled by WH Smith and Son Ltd, London)

Books

1	(1)	Advanced User Guide for the BBC Micro *Bray Dickens and Holmes*	(Cambridge Micro Centre)
2	(6)	BBC Micro Book: Basic, Sound and Graphics, *McGregor and Watt*	(Addison Wesley)
3	(8)	Spectrum Hardware Manual, *Dickens*	(Melbourne House)
4	(—)	Structured Programming with BBC Basic *Atherton*	(Horwood)
5	(2)	Complete Spectrum Rom Disassembly *Logan and O'Hara*	(Melbourne House)
6	(4)	Advanced Graphics on the ZX Spectrum *Angell and Jones*	(Macmillan)
7	(9)	Supercharge Your Spectrum *Webb*	(Melbourne House)
8	(—)	Vic20 Programmer's Reference Guide *Commodore*	(Commodore)
9	(—)	Anatomy of the Dragon *James*	(Sigma)
10	(3)	Commodore 64 Programmer's Reference Guide *Commodore*	(Commodore)

(Figures compiled by Watford Technical Books Watford 0923 23324)
(Last week's positions in brackets)

Atari

1	(1)	Miner 2049er	(Big Five)*
2	(—)	Preppie II	(Adventure International)
3	(2)	Pooyan	(Datasoft)†§
4	(—)	Zork I	(Infocom)§
5	(—)	Repton	(Sirius)‡
6	(6)	Ultima II	(Sierra On-line)‡
7	(—)	Deadline	(Infocom)§
8	(10)	Empire of the Overmind	(Avalon Hill)†
9	(7)	Clone Assault	(Avalon Hill)†
10	(—)	The Beasts of Blackpool	(Sirius)‡

*Cartridge †32K cassette §32K disc ‡48K disc.

(Figures compiled by Calisto Computers Birmingham 021 632 6458)


Morris meets the Bikers
NEW
ONE DAY THE PIMAN IS DISTURBED BY A STRANGE VISITOR
EVENIN SQUIRE SWETTIBITZ IS ME NAME - DOIN PIMEN FAVOURS IS ME GAME!
I'VE GOT A SHIP OUTSIDE YOU JUST WON'T BE ABLE TO RESIST
A POGO STICK A SAXOPHONE AND A CAN OF WORMS
BWOOSH!!
TITTAH MUGGINS
OY THOUGHT I JUST BOUGHT THAT!
LOOK AT THE LOG BOOK IT S I YOU'VE PAID YOUR HARD EARNED WORMS FOR BEEP!
EH, WOT?
THE NAME'S MORRIS BALDY! WHEN'S GRUB?
HOLD YOUR HORSEPOWER I INTEND TO GET MY POGO-STICK'S WORTH OUT OF YOU!
WHAT DO YOU KEEP STOPPING FOR?
LAY BY
BEEP! CAR SICKNESS!
MULTI-STOREY CAR PARK
I'VE-ER-GOT TO DO MY SHOPPING YOU CAN WAIT IN HERE!
AAGH! BEEP NO! I GET CLAUSTROPHOBIA!
LEMME OUTA HERE YA BUM!
NOW TO RETRIEVE MORRIS SO THAT I CAN SELL HIM TO SOME OTHER MUG! GO MY PHANTOM PHREAKY BIKERS
I'M FREE! TAKEEEE!
THE RAT'S ABANDONED ME! I'VE GOT TO GET OUT OF HERE BEFORE THE BIKERS COME AGAIN TO TAKE ME BACK TO OLD SWETTIBITZ BEEP!
TOO LATE! THE MAD BIKERS BLAZE IN, LIKE GHOSTS THROUGH THE BRICK WALL
SO BEGINS THE CHASE MORRIS IS THWARTED BY HESITANT RAMPS AND LOONY LIFT SHAFTS
ELEVATOR S
TREACHEROUS TIN-TACKS THAT SLOW HIM DOWN
HSSSS
YOW!
CREEPY CARBON MONOXIDE
GRRR!
CRUNCH!
AND CLINGING WHEEL CLAMPS THAT BRING HIM TO A GRINDING HALT.
Evans
HE NEEDS PRECIOUS PETROL FOR STAMINA
GARSP!
AND HAS TO COLLECT TEN GOLDEN COINS BEFORE HE CAN ESCAPE THROUGH THE EXIT TO THE NEXT SCREEN THERE ARE 9 SCREENS ALTOGETHER BEFORE HE IS FREE
MAYBE WE DON'T LIKE THE NOISE HIS HORN MAKES, AN MAYBE WE CAN'T GET HIM IN THE LIFTS - BUT WE CAN FLY THROUGH WALLS AN WE DON'T CARE ABOUT NO HAND SIGGERNALS OR DOUBLE YELLER LINES! HAR HAR!!
Lady Clair Sinclive says.
"DON'T MISS MY TEAR JERKING RENDITION OF LEADER OF THE PAC ON THE FLIPSIDE OF THE CASSETTE!"
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